



FRIDAY, APRIL 23.

Train Accidents in March.

The following accidents are included in our record for the month of March :

COLLISIONS.

REAR.

6th, a. m., passenger train on Central of Georgia ran over a misplaced switch and into freight standing on a siding at Sun Hill, Ga., damaging several cars. A trainman was slightly injured.

9th, p. m., freight on New York, Lake Erie & Western ran into preceding freight stopped at Nunda, N. Y., wrecking several cars. The wreck caught fire and 3 cars were burned up.

10th, night, freight on Memphis & Little Rock ran into some cars broken loose from preceding freight near Little Rock, Ark., damaging the engine and injuring the engineer.

12th, night, coal train on New York, Lake Erie & Western ran into preceding freight at Carrollton, N. Y., wrecking several cars.

13th, a. m., freight on Pennsylvania Railroad ran into preceding freight near Bristol, Pa., wrecking several cars.

13th, night, freight on Louisville, Evansville & St. Louis ran into preceding freight at English, Ind., damaging several cars.

14th, a. m., wild engine on Boston & Lowell ran into rear of milk train stopped at Tyngsboro, Mass., wrecking rear car. Fireman hurt.

16th, a. m., freight on Central of New Jersey ran into passenger train switching across main track at Roselle, N. J., wrecking several cars and damaging locomotive. There was a dense fog at the time.

20th, early, freight on Pittsburgh & Lake Erie ran into some cars which had run out of a siding upon the main track in Pittsburgh, Pa., wrecking several. The cars appear to have been left without setting the brakes.

20th, night, passenger train on New York, Lake Erie & Western ran into rear of a freight at Sterling Junction, N. Y., wrecking engine and 2 cars.

24th, a. m., freight on Pennsylvania Railroad ran into preceding freight on the high trestle on the Harsimus Cove freight branch in Jersey City. Several cars were damaged and one was thrown from the trestle, fell on the roof of a house, and went clear through to the basement.

24th, a. m., wild engine on New York, Lake Erie & Western ran into rear of freight stopping at Andover, N. Y., wrecking caboose.

29th, p. m., construction train on Chicago, Burlington & Northern ran into preceding construction train near Black River, Wis., wrecking caboose and injuring 5 men.

29th, night, passenger train on Chicago & Northwestern ran over a misplaced switch and into freight on a siding at Waukegan, Ill., damaging both locomotives and injuring an engineer slightly.

29th, night, freight on Ogdensburg & Lake Champlain broke in two near Brushton, N. Y., and the rear section ran into forward one, damaging several cars. The conductor was looking out of the caboose door and the shock shut the door suddenly, breaking his neck and killing him instantly.

31st, very early, freight on New York, Lake Erie & Western broke in two at Tuxedo Park, N. Y., and rear section ran into forward one, wrecking several cars.

BUTTING.

5th, night, butting collision between two freights on Flint & Pere Marquette, near Lake Michigan, damaged both engines and 13 cars and killed 2 trainmen.

6th, a. m., butting collision between coal trains on Northern Central near Coal Point, N. Y., wrecked both engines and 29 cars, and injured 3 trainmen.

21st, p. m., butting collision between two freights on East Tennessee, Virginia & Georgia near Chattanooga, Tenn., damaged both engines and injured a trainman.

23d, a. m., butting collision between Burlington & Missouri River freight and Union Pacific passenger in Omaha, Neb., damaged both engines and injured 2 trainmen.

24th, a. m., butting collision between passenger trains on South Carolina road near Branchville, S. C., damaged both engines and several cars.

CROSSING.

29th, p. m., Pittsburgh, Cincinnati & St. Louis freight ran into Columbus, Hocking Valley & Toledo freight at the crossing in Columbus, O., wrecking an engine and 2 cars.

DERAILMENTS.

BROKEN RAIL.

2d, night, passenger train on Grand Trunk was derailed on a bridge near Belleville, Ont., by a broken rail, and the engine knocked down the bridge truss and with 3 cars fell upon the ice below. Four passengers were fatally hurt; 3 trainmen and 11 passengers less severely injured.

2d, night, freight on New York, Ontario & Western was derailed at Fish's Eddy, N. Y., by a broken rail. The derailment was close to the bridge over the East Branch of the Delaware, and the derailed cars struck the bridge truss and knocked it down, 5 cars falling with it into the river. Four trainmen went down with the wreck and were killed.

8th, p. m., passenger train on Dayton & Ironton was derailed at Paint Creek, O., by broken rail, injuring a trainman and 6 passengers.

12th, night, passenger train on East Tennessee, Virginia & Georgia, was derailed near Godwinville, Ga., by broken rail, injuring 5 passengers.

16th, p. m., freight on Indianapolis & St. Louis was derailed in Indianapolis by broken rail. The engine and 10 cars were piled up in a bad wreck and 4 trainmen were hurt.

21st, a. m., passenger train on Charlotte, Columbia & Augusta was derailed near Lexington, S. C., by broken rail.

BROKEN RAIL-JOINT.

30th, a. m., freight on Louisville, Evansville & St. Louis was derailed near Evansville, Ind., by a broken rail-joint, and several cars were wrecked.

BROKEN SWITCH-ROD.

19th, night, wild engine on St. Louis, Iron Mountain & Southern was derailed at Jacksonville, Ark., by broken switch-rod. Engineer slightly hurt.

BROKEN BRIDGE.

5th, a. m., freight on East & West (Alabama) broke through trestle bridge near Taylorsville, Ga., engine and 10 cars going down 30 ft. in a bad wreck, killing one trainman and injuring 3 others.

24th, a. m., freight on Jefferson lumber road broke through a trestle bridge near Kildare, Tex., and the engine went down 14 ft. with 3 log cars on top of it, killing the engineer and 3 laborers and injuring another employe.

29th, night, construction train on Columbus & Western broke through a bridge near Opelika, Ala., and the whole

train went down into the Tallapoosa River. The engineer and fireman were hurt and 19 laborers were drowned. The abutments of the bridge had been weakened by a freshet.

SPREADING OF RAILS.

2d, a. m., passenger train on Central Vermont was derailed near St. Albans, Vt., by the spreading of the rails. The engine and 3 cars ran across a field for some distance.

8th, night, freight on Wabash, St. Louis & Pacific was derailed near Williamsport, Ind., by spreading of the rails.

12th, p. m., passenger train on Michigan & Ohio was derailed near Eckford, Mich., by spreading of the rails, and rear car was thrown over into the ditch, injuring 1 passenger fatally, 10 seriously, and 19 less severely.

22d, a. m., passenger train on Rome, Watertown & Ogdensburg was derailed near North Parma, N. Y., by spreading of the rails.

24th, a. m., passenger train on Jacksonville & Southeastern was derailed near Centralia, Ill., by spreading of the rails.

31st, p. m., passenger train on Louisville, Evansville & St. Louis was derailed near Huntingburg, Ind., by spreading of the rails. The rear car upset, killing a child, injuring 17 passengers seriously and 8 others slightly.

BROKEN WHEEL.

6th, a. m., engine of freight on West Shore was derailed near Mt. Marion, N. Y., by a broken truck wheel. Engineer was hurt.

BROKEN AXLE.

3d, very early, freight on New York, Lake Erie & Western was derailed in Belvedere, N. Y., by broken axle.

3d, a. m., passenger train on Worcester, Nashua & Rochester was derailed near Harvard, Mass., by broken axle under the tender.

6th, a. m., freight on New York, Lake Erie & Western was derailed near Friendship, N. Y., by broken axle.

12th, night, passenger train on Western & Atlantic was derailed near Graysville, Ga., by broken axle.

16th, a. m., freight on Central of Georgia was derailed near Milledgeville, Ga., by broken axle.

18th, a. m., three cars of freight on Philadelphia & Reading were derailed near Tanquea, Pa., by broken axle. The wreck caught fire and was destroyed.

19th, a. m., passenger train on New York Central & Hudson River was derailed near Lockport, N. Y., by broken axle under the tender.

BROKEN BRAKE-BEAM.

16th, a. m., freight on Union Pacific was derailed near David City, Neb., by a broken brake-beam, and 2 trainmen were hurt.

ACCIDENTAL OBSTRUCTION.

15th, p. m., freight on Grand Junction road in Boston ran over a man carrying a board on his shoulder. The man was killed and the board threw the locomotive from the track.

CATTLE ON TRACK.

8th, a. m., freight on Louisville, Evansville & St. Louis ran over a horse near Oakland, Ind., and engine and 3 cars were derailed, injuring 2 trainmen.

14th, night, freight on Montgomery & Eufaula ran over a cow near Batesville, Ala., and was derailed and engine upset, killing engineer and fireman and injuring another trainman.

LAND-SLIDES AND WASH-OUTS.

7th, early, as freight on Atlantic & Pacific was running through Johnson Canyon, Ariz., a large rock rolled down and struck the engine, throwing it and 4 cars from the track. The fireman was killed; the engineer and another trainman hurt.

15th, a. m., passenger train on Louisville & Nashville ran into rock fallen on track near Verona, Ky., derailing engine and 4 cars and injuring 2 trainmen.

20th, night, freight on Pittsburgh & Lake Erie ran into land-slide near Stoop's Ferry, Pa., derailing engine and 20 cars and killing 2 trainmen.

30th, very early, freight on Alabama Great Southern ran into wash-out near Carthage, Ala., and the engine went down.

30th, p. m., freight on Alabama Great Southern ran into land-slide near Rising Fawn, Ga., and engine and several cars were derailed.

31st, a. m., as passenger train on New York, Lake Erie & Western was passing Pond Eddy, Pa., a land-slide struck a rear car and threw it from the track.

31st, night, passenger train on Pittsburgh, Wheeling & Kentucky was derailed near Wheeling Junction, W. Va., by running into a land-slide.

31st, night, coal train on Philadelphia & Reading ran into land-slide near Penn Haven Junction, Pa., and 60 empty coal cars were piled up on top of the engine in a bad wreck. The engine and firemen were injured.

SNOW.

1st, night, freight on Grand Trunk was derailed near Locks Mill's, Me., by snow packed down in a crossing, and both engines were upset, injuring 2 trainmen, 1 fatally.

MISPLACED SWITCH.

20th, night, freight on New York Central & Hudson River was derailed at Pittsford, N. Y., by a misplaced switch.

27th, night, freight on Union Pacific was derailed near Alkali, Neb., by misplaced switch. Both engines upset, killing fireman and injuring 2 other trainmen.

MALICIOUSLY CAUSED.

18th, a. m., passenger train on Texas & Pacific was derailed near Marshall, Tex., where the fastenings had been removed from a rail. Fortunately the train was running very slowly and little damage was done.

19th, p. m., passenger train on Texas & Pacific was derailed near Iona, Tex., by obstructions placed on the track. The shock caused the boiler of the locomotive to explode, killing the engineer and fireman.

23d, p. m., freight on Missouri Pacific was derailed near Sedalia, Mo., where fastenings had been purposely removed from several rails. Four trainmen were slightly hurt.

22d, night, passenger train on Louisville, New Albany & Chicago was derailed near Bloomington, Ind., by obstructions piled on the track in a cut. The engineer was slightly hurt.

30th, a. m., freight on the Missouri Pacific was derailed near Kansas City, Mo., by a switch which had been purposely misplaced.

30th, a. m., passenger train on Missouri, Kansas & Texas was derailed near Parsons, Kan., where the fastenings had been purposely removed from a rail. The engine and 2 cars went down a bank and a trainman was injured.

UNEXPLAINED.

1st, a. m., four cars of freight on Pennsylvania Railroad ran off the track in Jersey City, N. J., and were wrecked.

3d, p. m., several cars of freight on Illinois Central were derailed near Galena, Ill., and damaged.

9th, night, 5 cars of freight on Gulf, Colorado & Santa Fe were derailed near Cameron, Tex. Three tramps who were stealing a ride were badly hurt.

11th, night, freight on Chicago & Northwestern was derailed near Watertown, Wis., injuring the engineer.

19th, p. m., freight on Indianapolis & St. Louis was derailed in East St. Louis, Ill., and 2 cars upset.

19th, p. m., passenger train on Erie & Wyoming Valley was derailed near Middle Valley, Pa., and the engine upset. The fireman jumped, but was caught under the engine and crushed to death. The engineer was slightly hurt.

22d, p. m., coal train on Delaware & Hudson was derailed near Pittston, Pa., and 10 cars were wrecked.

24th, night, 2 cars of freight on Wabash, St. Louis & Pacific were derailed near Elsdon, Ill.

27th, a. m., freight on Kansas City, Ft. Scott & Gulf was derailed in Rosedale, Kan., doing slight damage.

OTHER ACCIDENTS.

BROKEN PARALLEL-ROD.

2d, p. m., engine of passenger train on Boston & Albany broke a parallel-rod when near Brighton, Mass., damaging the engine considerably.

21st, a. m., engine of passenger train on Burlington & Missouri River broke a parallel-rod when near Holdrege, Neb., damaging the engine badly.

MISCELLANEOUS.

13th, p. m., as new locomotive on the Lehigh Valley was making a trial trip, in passing under a highway bridge at Hokendauqua, Pa., the smoke-stack, being too high, struck the bridge and was torn off and thrown back upon the cab with such violence that it broke through the roof, striking the engineer on the head and killing him.

13th, p. m., engine of passenger train on Central of New Jersey broke a driving axle when near Glen Gardner, N. J., but did not leave the track.

SUMMARY.

This is a total of 81 accidents, in which 49 persons were killed and 181 injured. As compared with March of last year, there was a decrease of 5 accidents, but an increase of 32 killed and 47 injured.

The three months of the current year to the end of March show a total of 273 accidents, 111 killed and 378 hurt; an average per month of 91 accidents, 37 killed and 126 injured.

A fuller statement of the totals and averages, with a summary of the causes of accident, will be found on another page.

New England Railroad Club.

The regular monthly meeting of the club was held on Wednesday evening, April 14, Vice-President J. N. Launder in the chair.

The committee appointed to entertain the Master Mechanics' Association at the forthcoming convention at Boston was announced as follows: John Kent, Charles W. Sherburne, George W. Peck, A. G. Barber and Joel H. Hills.

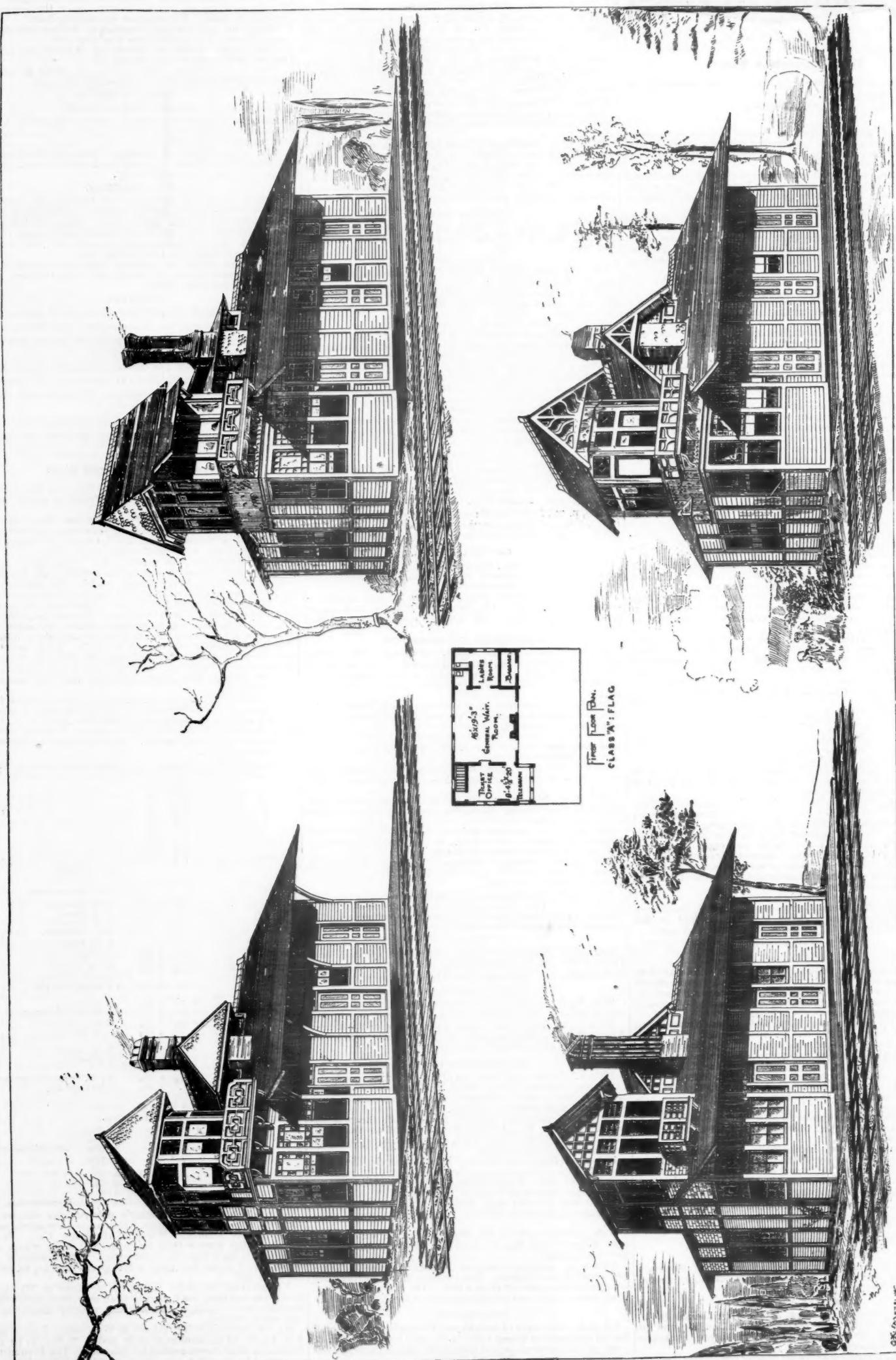
THE CHAIRMAN: The subject for consideration is the proper variation that is admissible between the flanges of wheels that run on New England roads. The Master Car-Builders' Association established a standard distance between the flanges of wheels of 4 ft. 5 1/2 in. Afterward, on account of inevitable variations in thickness of flanges, rough flanges, etc., that Association modified that distance by allowing a variation of 1/2 in. in each way, making the maximum distance 4 ft. 5 1/2 in. and the minimum 4 ft. 5 1/4 in. What is the admissible limit of variation, looking to the safety of running? We are undoubtedly running wheels that have a variation of an inch, perhaps more, some narrower than the standard, some wider.

A considerable number of letters have been received from the officers of the different roads, in reply to the circular of inquiry sent out by the Secretary of this Association, as to what should be the rejecting limit of gauge of wheels now in service and upon other points. The substance of their replies is as follows:

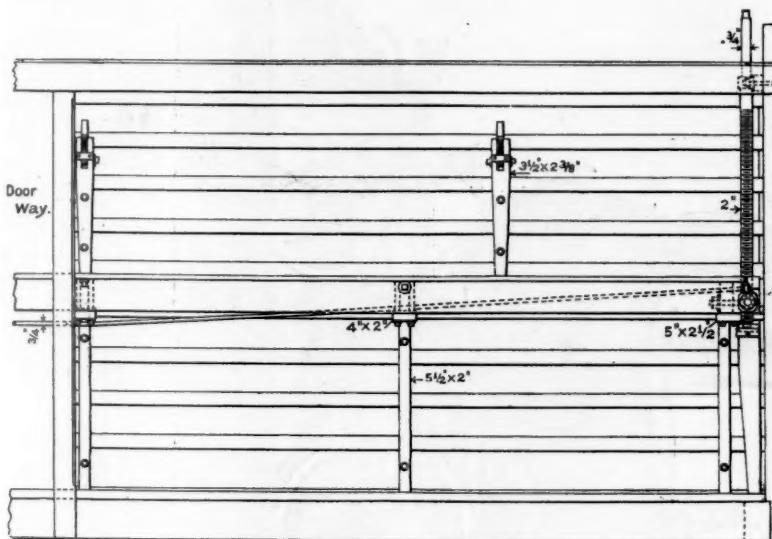
INSPECTORS' LIMIT GAUGE FOR RECEIVING WHEELS BEYOND WHICH CARS WILL BE REJECTED BY THE FOLLOWING PARTIES.

Name of road.	Minimum gauge between flanges.	Maximum gauge between flanges.	Name of road.	Minimum gauge between flanges.	Maximum gauge between flanges.
Boston & Albany.			F. D. Adams.		
Old Colony.			J. N. Launder.		
Boston & Maine.			D. C. Richardson.		
Eastern.	4 4 3/4	4 5 1/4	J. W. Marden.		
Fitchburg.			F. A. Perry.		
Cheshire.			J. B. Henney.*		
N. Y. & New Eng.			Geo. Richards.		
Boston & Prov.			J. K. Taylor.		
Boston & Lowell.	4 5	4 5 1/4	Joseph Wood.		
Del. & Hudson.	4 5	4 5 1/4	R. Blackall.		
Illinois Central.	4 5 1/4	4 5 1/2	W. B. Snow.		
Chicago, Bur. & Quincy.	4 5	4 5 1/4	Godfrey W. Rhodes.		
Lake Shore & Mich. Southern.	4 5	4 5 1/4	William Forsyth.		
Lehigh Valley.	4 5	4 5 1/4	John Kirby.		
Grand Trunk.	4 5 1/4	4 5 1/2	H. Stanley Goodwin.		
Bur. & Lamotte.	4 5 1/4	4 5 1/2	Herbert Wallis.		
N. Y., L. E. & Western.	4 5	4 6	F. G. Brownell.		
Maine Central.	4 5	4 5 1/4	R. H. Soule.		
Ramapo Wheel & Foundry.	4 5 1/4	4 5 1/2	S. Pillsbury.		
B. R. B. & L.	4 5	4 5 1/4	W. W. Snow, recommends.		
			John Coghlan.		

* NOTE.—Road gauge 4 ft. 8 1/4

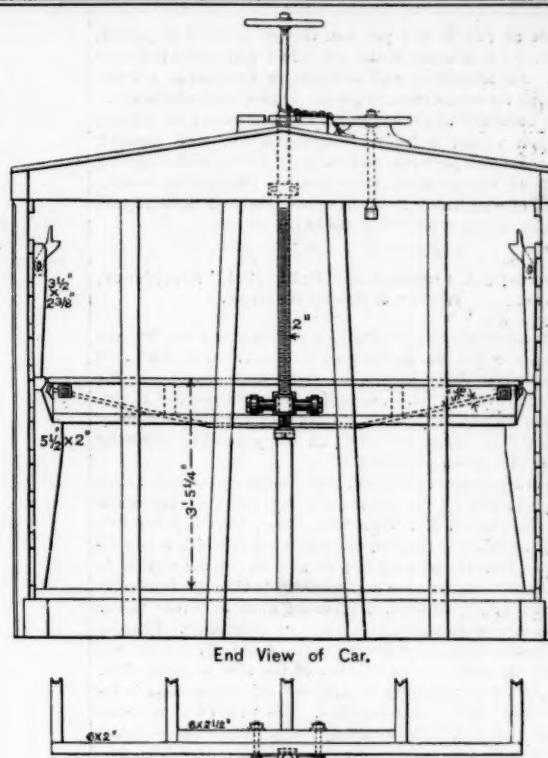


STANDARD STATIONS, WEST SHORE RAILROAD, CLASS A, FLAG.



Side Elevation of Inside of Car.

DOUBLE-DECK STOCK CAR.



Plan of End of Double Deck.

tee who were present at that meeting, the New York & New England had no objection to 4 ft. 4 1/4 in., while they had an objection to 4 ft. 4 1/2 in. The Boston & Albany and some others wanted 4 ft. 4 1/4 in., but as the New York & New England held out for 4 ft. 4 1/2 in., there was a sort of compromise between 4 ft. 4 1/4 in. and 4 ft. 5 in., and 4 ft. 4 1/4 in. was fixed upon.

Mr. F. D. ADAMS (Boston & Albany): Our accidents have invariably resulted from wide gauges. Guard-rails and frogs wear and few guard-rails are set at 1 1/4 in., but many are 2 1/2 in. The old, not the new wheels, make the difficulty. The wide gauge wheels under Western cars enter the guard-rail, and being too wide, take the wrong point of the frog. If the gauge were narrow, the wheels would keep within the rails, even if they strained the frog. When a wheel mounts the frog, it may damage the track, and not be any advantage to the car. It may start the wheel off; but many wheels run over frogs, right up on the flange, and I would rather risk them that way than to take the wrong point of the frog, because that will surely wreck the train. We rejected a car lately gauging 4 ft. 6 1/4 in. between one pair of wheels—a very dangerous width.

Mr. DAVIS: The limit adopted should not injure the track. A distance of only 4 ft. 4 1/4 in. will loosen the guard rails.

THE CHAIRMAN: Few guard rails are 1 1/4 in. from the main rail after a week's wear. Some in the Boston yards are 3 1/4 in. This is caused by improper fastening of the rails, and not by wheels out of gauge. A large number of old wheels are less than 4 ft. 5 in., and it would be highly inconvenient if they were stopped.

Mr. ADAMS: Our Chief Engineer informs me that cars will run through our frogs and guard rails at 4 ft. 4 1/4 in. A great many wheels are not to gauge, but it would be inconvenient to reject all such cars. We sometimes notify parties that their wheels appear unsafe.

Mr. H. L. LEACH: Some definite limit should be strictly adhered to, otherwise cars will be rejected on one road and not on another.

Mr. Chamberlain's motion, slightly amended by the Chairman, was then put to the meeting and carried in the following form:

"That the standard distance between wheel flanges as adopted by the Master Car-Builders' Association, of 4 ft. 5 1/4 in., with a limit of 5/8 in. in each way, be indorsed by this club, for driving wheels; and that an inspectors' limit be established of a minimum distance of 4 ft. 4 1/4 in., and a maximum distance of 4 ft. 5 1/4 in."

Mr. ADAMS: The New England roads use a wheel about 5/8 in. narrower than the Western and the Pennsylvania roads. The committee thought it advisable to increase the tread to 5 1/4 in. in each way, instead of 5 1/2 in. owing to shrinkage and wear of pattern. The committee considered the width of tread should be increased 5/8 in. and Mr. Nye and other wheel-makers assented. When it is driven 4 ft. 5 in., it will meet the Pennsylvania standard, 5 ft. 4 in., from outside to outside, and 4 ft. 5 in. inside. The Pennsylvania will not take any less.

The following letters were then read:

"We inclose our reply to your recent circular. For your information I would state that at a general meeting of the Master Mechanics of the Chicago, Burlington & Quincy system recently, it was moved that the company's representative to the annual convention to be held at Niagara in 1886, be instructed to have inserted in Rule 3, 'Cars may be refused for any of the following defects,' the following clause under an additional paragraph, 'wheels gauging less than 4 ft. 5 in., or more than 4 ft. 5 1/4 in. between flanges.'

G. W. RHODES,

"Supt. Motive Power, Chicago, Burlington & Quincy."

"In answer to your circular as to the limit gauge of wheels, we would say that we would make the gauge limit to have a maximum of 4 ft. 5 1/4 in., and a minimum of 4 ft. 5 in., beyond which, either way, we would reject as dangerous to run. It seems singular that the officers of the different roads cannot arrange to keep within the limits adopted by the M. C. B. Association, which allows 5/8 in. either way. It would seem as if that limit ought to be sufficient; but if, as you say, it is overlapped, we think that certainly the limit which I have named above should be sufficient to any party who attempts to gauge to 4 ft. 5 1/4 in. If any party cannot come within 5/8 in. either way, it would seem as if no limit would be of any use to such party."

"You ask: 'In what way can these difficulties be overcome with the least possible obstruction to traffic?' I would say by the master car-builders and those under them using a little care in the fitting of their wheels. I know of no other way, and it would seem as if there was not much use in hav-

ing a limit of any kind if people fit their wheels so carelessly as to go beyond the limit, particularly when it is such a large limit as 5/8 in. either way."

"H. STANLEY GOODWIN,
General Superintendent Lehigh Valley Railroad."

The meeting then adjourned. The attendance was very satisfactory, over 60 members of the Club being present.

West Shore Standard Stations.

The problem of reconciling the economy and convenience of standard plans for buildings with the avoidance of monotony, so that each building may have a certain individuality, was solved on the West Shore road, when it was building, by preparing a series of standard drawings for various sizes of stations, viz.: Class A, Flag; Class a, Agent; Class B, Class C, and Class D, and then introducing a certain number of variation in the minor details of each plan, principally in the roofs; sufficient to give some individuality and local character to each building, but not sufficient essentially to alter the main details of the plan. We illustrate in this issue four such variations in the general plan of the smallest size of station, Class A, Flag. All the four designs shown are built to the same ground plan, and all of them will be seen on critical examination to be essentially the same building, yet they have the general effect to the eye of being each a different design, owing solely to some really trifling changes in the tower, chimney, balcony, window-glazing and form of roof.

The various classes of freight stations were treated in the same way, although their less ornate character made it difficult to secure marked difference of effect.

Plans for all the stations on the line were prepared by Messrs. Wilson Brothers and Co., Civil Engineers and Architects, of Philadelphia.

Double-Deck Stock Car.

The accompanying illustrations represent a double-deck stock car, invented by Mr. M. D. Jones, Trainmaster, and Mr. C. A. Smith, Chief Train Dispatcher, both of the Lake Shore & Michigan Southern Railroad.

The three engravings give a part longitudinal elevation, a cross section, and a plan of the end of a car fitted with this improved double deck. From these it will be seen that the portable deck when in its normal position rests on posts that it is elevated and lowered by the screws, and when raised, the weight is taken by the lugs or hooks in top of the car. The two screws are used simply for raising and lowering, and are moved by brake-handles, fitting on sockets in roof and chained to the car. Where not in use, they are put in holes in edge of roof made for that purpose. The car itself has to be built a little higher than ordinary cars, so that when the portable deck is raised, there will be the height of an ordinary single-deck under it.

One of these cars was built in 1888 for the Lake Shore & Michigan Southern, and a few cars have been running for some years on the Chicago & West Michigan, but with these exceptions, these cars have not been much used, though the principle has met with much commendation from railroad officials.

The object of the car is thus stated by the inventors:

"The car is so constructed that it can be used either as a merchandise car or for horses and cattle, or for two decks of small stock. The deck is adjusted by means of a 2 in. screw in the centre of each end of the deck and worked at the roof by a brake-wheel key or wrench, and is adjusted in three minutes. The deck is raised and lowered from centre to roof. When down it has a solid support of posts along the sides and ends, and when up, it rests on self-adjusting sup-

ports, thereby relieving the screws of all carrying strain, their only office being to raise and lower the deck. The keys or wrenches when not in use drop down through roof of car entirely out of the way. The estimated cost of construction is about \$15 in excess of an ordinary double deck."

"The many advantages of this car over ordinary double decks or single decks will be readily appreciated by all practical railroad men. It is easily and quickly converted from a single deck to a double deck and vice versa. The same means admits of the car being loaded with merchandise—thus saving the dead haul that ordinary double decks are subject to. These decks can, with very little expense, be put in old cars."

Any further information can be obtained from the inventors at Toledo, Ohio.

Foreign Railroad Notes.

The North Italian Railroad has discovered a new way of making a little money. The tickets which it sells to places of considerable importance have a pocket on the back which contains a sort of newspaper sheet, printed on thin paper, which contains advertisements of the hotels, shops, and various objects of interest in the place to which the buyer of the ticket is going, in which, if he is not very familiar with the place, he may be supposed to be particularly interested while on his journey thither. The company gets paid for these advertisements, and realizes a small amount from them.

Russia has followed Prussia and Austria in establishing a "railroad council," whose duties seem to be to give expression to what the various interests of the country desire to have the railroads do, and discuss the proposed measures with representatives of the railroads. The Russian council consists of three officers from the Ministry of Communications, one each from the Ministries of Justice, War, Public Lands, Interior, Finance and the Comptroller of the Empire; two representatives of railroad companies, two of agriculture and mining, two of trade and manufactures, with a secretary from the Ministry of Communications. The most noticeable act of its first session, perhaps, is that it was opened with prayer.

The Austrian millers complain bitterly of discrimination in railroad rates against them and in favor of Hungarian millers, and have secured a government investigation. The Hungarian flour pays through and the Austrian flour local rates, and the railroad managers, including the managers of the state railroads, say this cannot be helped.

The Austrians demanded temporarily a graduated tariff, already in force on the State Railroads, of 1.228 cents per ton per mile for the first 46.6 miles (75 kilometers), 0.995 cent thence up to 155 miles (250 kilometers), and 0.761 cent for any excess over this distance, the latter being at the rate of about 21 cents per 100 lbs. from Omaha or Kansas City to Chicago, or of 37 cents from Chicago to New York, the actual rates being 25 cents for flour for either haul.

There has been for many years in Germany an association of the steel rail mills which sought to maintain the prices of rails, and seems to have succeeded very well. It permitted a reduction of prices when bidding for contracts in foreign countries, where the competition of mills outside of the pool (chiefly English) had to be met; and considerable complaint was heard in Germany because German mills sold rails to be sent to Italy, etc., for \$3 or \$4 less per ton than the lowest price at which they sold any rails in Germany. A few years ago this association, or one modeled after it, was extended so as to include, it was understood, all the Bessemer works in Europe, including the English works, and kept up

prices at \$24 to \$25 per ton, though in previous periods of similar light demand the price had gone down to \$21 or less. The association was attacked in England as not permitting the works there to get the share of the business which they naturally would command, and now two of the leading English works, Boleckow, Vaughan & Co., with capacity for 4,000 tons per week, and Cammell & Co., with capacity for 3,500 tons per week, have given the required six months' notice of withdrawal from the association, and there is talk of prices going down as low as \$18 per ton.

Double-truck Locomotive, "Pakanoket," Providence, Warren & Bristol Railroad.

The accompanying illustrations represent an engine constructed by the Mason Machine Works, Taunton, Mass., for suburban passenger service on a short line running from the city of Providence, R. I., along the beautiful shore of Narragansett Bay to the quaint old town of Bristol. For many years this line could only effect an entry into Providence by means of a backing-out switch.

In order to avoid the loss of time, inconvenience, and even danger caused by the engine pushing the train backward into the station, Mr. Waterman Stone, the Engineer and Superintendent of the line, laid out a curve which would enable the trains to be worked into and out of the station in the regular manner. Owing, however, to the close proximity of a steeply sloping bluff, a curve of even moderate radius would involve an enormous amount of excavation. In order to minimize this a very sharp curve of 211 ft. radius was finally adopted. A sketch plan of the site is given below. The old line on which the backing-out switch was used is indicated by the cross-hatched lines. The new curve is shown by the solid line. The extremely sharp radius was rendered necessary by the presence of a steep bluff 130 ft. high. The new curve as shown leaves the existing track at the end of a bridge over the Seekonk River. The radius of curvature decreases every 50 ft. until the minimum radius is reached. At the end of this curve of minimum radius, the radius is increased every 11 ft. until the tangent is reached.

Mr. Waterman Stone, the Superintendent and Engineer of the line, writes :

"This curve will be traversed with ease by the 'Pakanoket.' To enable the eight wheelers to traverse it the flanges are taken off the front drivers, and the width of tyne increased to 7 in. A third and fourth rail will also be laid on the inside of the curve for the blank wheel to run off on. The locomotives ride much easier, and are much easier on track since the flanges have been taken off. The weight of the rails is 70 lbs. per yard." It was found by actual experiment that the ordinary engines of the American or Forney type were unable to work round so sharp a curve satisfactorily. It was therefore evident that some special form of engine was required. The "Pakanoket" was therefore designed to meet these special requirements, and has been at work a short time, and has done remarkably well, reflecting great credit upon her designer, Mr. John T. Meats, Superintendent of the Mason Machine Works. Mr. Meats has had considerable experience with the bogie or two-cylinder Fairlie engine, and has so modified the four-cylinder bogie form of engine originally introduced by the late Robert Francis Fairlie, that the "Pakanoket" and similar engines are closely identified with the Mason Machine Works. In making a test on a curve roughly laid in a ballast hole, the "Pakanoket" passed round a curve of 193 ft. radius (30 degrees) with ease, while an engine of the usual American type spread the track so badly that the trial had to be discontinued.

The "Pakanoket" has, strictly speaking, three trucks. The forward truck has two wheels only. The centre truck has four wheels, drivers, and carries the cylinders. The hind truck has six wheels.

The forward bogie or driving truck consists of two pairs of drivers coupled and a two-wheeled leading truck, the latter arranged so as to be adjustable to any desired curvature of track and to keep the flanges of the forward drivers as far from the rail as may be considered desirable when running ahead.

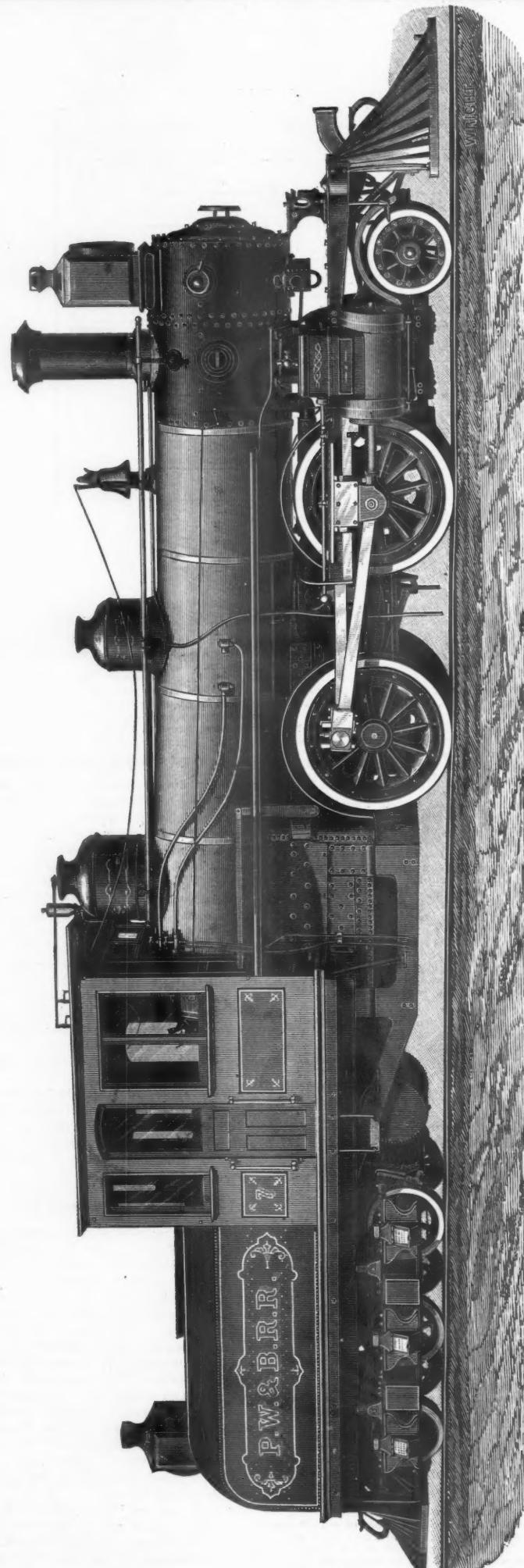
The rear bogie or tender truck is made centre-bearing, with elliptic side springs to prevent rocking, and porpoise springs to transmit the weight to the axles.

The weak point of the Fairlie engine has always been the steam pipe joints. As the cylinders and drivers are mounted on a truck having a swiveling motion in relation to the boiler, it is evident that the steam pipes joints must be free to swivel, and that they will have a small angular motion in passing round curves. In engines built under Mr. Fairlie's directions, these joints always gave more or less trouble. Mr. Meats has completely overcome any leakage by the simple and ingenious arrangement shown in detail in our illustration. The elasticity of the long bolts is further assisted by spiral springs under the nuts, and consequently a constant pressure is maintained on the surfaces in contact under all circumstances. As the steam pipes do not pass through the centre pin of the truck, they are perfectly accessible at all times, and the construction of the truck centre is much simplified.

To prevent wear of the main driver flanges when running tender first, a heavy adjustable spring lever is thrown into gear, by means of which the tender truck guides the drivers in a manner similar to, but slightly more elastic, than that in which the forward truck of a standard engine guides its drivers when running ahead.

This arrangement makes the engine remarkably steady when running in either direction, as compared with a standard engine; in fact, about as easy as a passenger car.

By the attainment of this end it is only reasonable to suppose that much concussion upon and consequent wear of per-



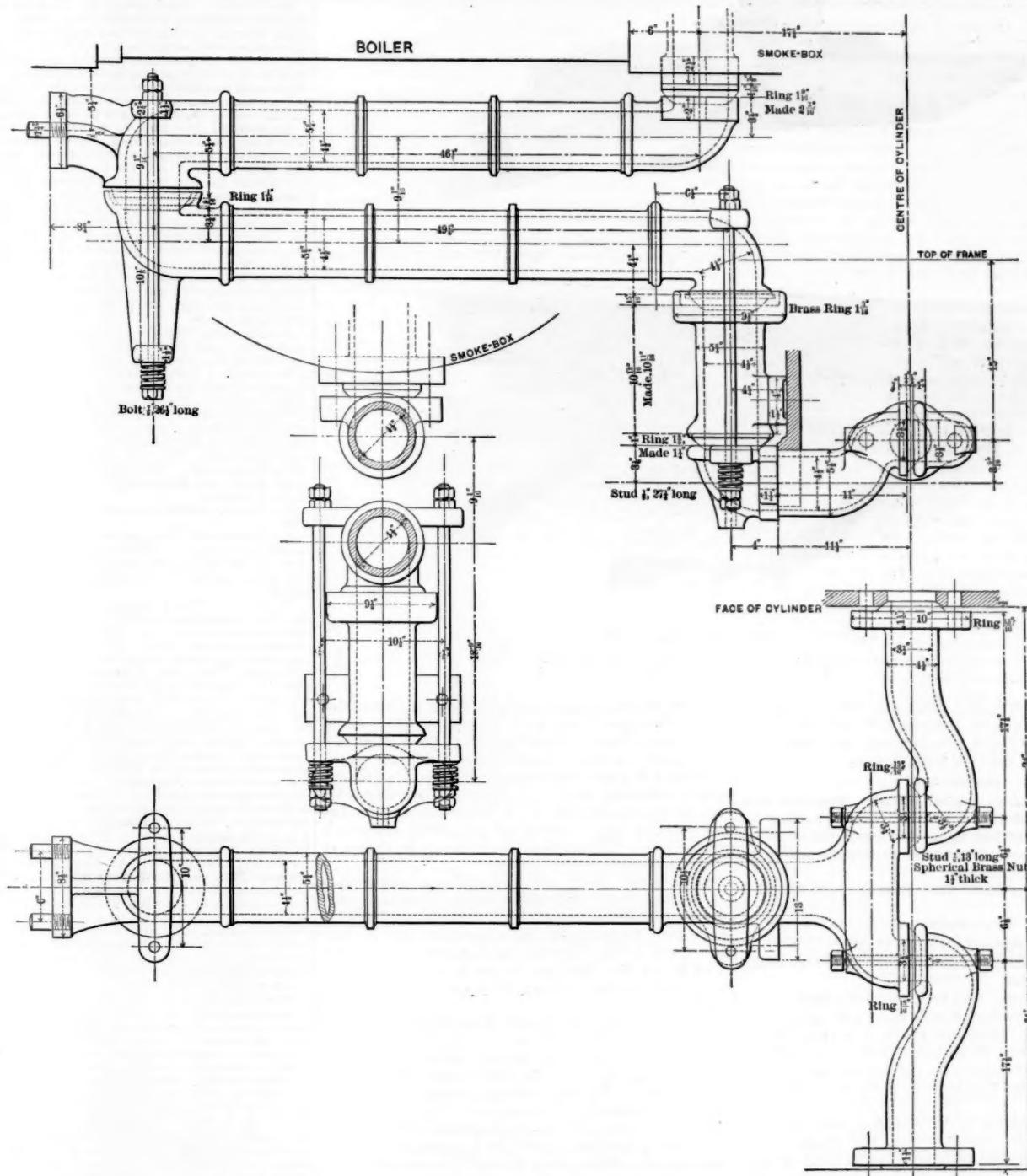
BOGIE LOCOMOTIVE "POKANOKET"—PROVIDENCE, WARREN & BRISTOL RAILROAD.
Built by the MASON MACHINE WORKS, Taunton, Mass.

manent way is prevented; for every lurch or thrust of the engine is represented by a corresponding injury to the rail. In practice, however, it is found to be unnecessary to use this device, as the flange wear is practically non-existent, whether the engine runs forward or backward.

The peculiar design enables a wide fire-box to be used, and consequently the blast orifice can be enlarged, reducing the back pressure. The engine practically throws no sparks and is very light on fuel. The deflector plate in the smoke-box is adjustable and can be secured in any position, so as to leave

any desired orifice for the products of combustion between the bottom of the movable diaphragm and the smoke-box. To render possible the use of a large nozzle, the inside barrel of the stack is made of the "vene contracta" form. By means of these improvements and the use of a brick arch in the fire-box, the engine shows ample, and at the same time economical, steaming capacity.

By allowing the butt of the boiler to project into the cab only far enough to attach the usual fittings, the dome is brought to its proper place at the centre of the crown, and



BOGIE LOCOMOTIVE "POKANOKET." DETAILS OF STEAM PIPE CONNECTION.

ample room is obtained in the cab. The engine is fitted with the common link motion (the link being made broad for wear), balance-valves, and all the modern improvements, advantage being taken of the opportunity which this style of engine permits, to make the journals and other wearing surfaces very large.

The locomotive is named "Pokanoket," from the former home of the Indian "King Philip," who, when Roger Williams landed, greeted him with the memorable salutation: "What Cheer?"

The following is a very full and complete specification of the engine :

GENERAL DIMENSIONS.

CYLINDERS, diameter and stroke.....	16 in. x 24 in.
DRIVERS, diameter on tread.....	56 in.
GAUGE.....	4 ft. 8½ in.
FUEL.....	Soft coal.
WHEEL BASE, total.....	35 ft. 0¼ in.
" steam truck	14 ft. 0 in.
" driving	7 ft. 0 in.
WEIGHT on front truck	12,500 lbs.
" drivers	61,800 lbs.
" hind truck	52,000 lbs.
Total in working order.....	128,300 lbs.
TRACTIVE FORCE per lb. average pressure in cylinders..	109.7 lbs.
TANK capacity.....	2,000 gallons

BOILER.

CONSTRUCTION.—Otis steel $\frac{3}{8}$ in. thick; pitch of rivets not to exceed 2 in.; all horizontal seams double riveted; all seams calked inside and outside with round nosed tool. All sheets beveled before erection to avoid grooving. Barrel 48 in. diameter, with raised crown and one dome.

TUBES, lap welded charcoal iron set in copper ferrules, 165 in. number, 2 in. dia. and 11 ft. 10 in. long.

FIRE-BOX, 72 in. long, 38 in. wide, and 63 in. high inside; best homogeneous steel; all plates thoroughly annealed after flanging; side and back sheets $\frac{3}{8}$ in., crown sheet $\frac{3}{8}$ in., flue sheet $\frac{1}{2}$ in. Firedoor flanged out, Webb's method.

WATER SPACE, 3 in. bottom, 4 in. top. Staybolts, $\frac{1}{2}$ in., screwed and riveted, not to exceed $4\frac{1}{2}$ in. pitch.

CROWN-BARS, double, flat wrought iron 5 in. x $\frac{3}{4}$ in., set $1\frac{1}{4}$ in. above crown, not over $4\frac{1}{2}$ in. pitch, and bearing on sidesheets. Crown-bar bolts screwed by cone-shaped heads to crown sheet, with nut and washers on top of crown-bars. Crown stayed by braces to dome and outside shell.

CLEANING HOLES.—Cleaning plugs in corner of fire-box.

STEAM BOGIE.

CENTRE-BEARING, with four driving wheels and a two-wheel leading truck.

FRAME, best hammered iron forged solid.

PEDESTALS protected from wear by cast-iron gibs and wedges. Pedestal caps lugged and bolted to bottom of pedestals.

DRIVING-WHEELS, best charcoal cast iron.

TIRES, Krupp's, crucible 3 in. thick, $5\frac{1}{2}$ in. wide finished, both pairs flanged.

DRIVING AXLES, Krupp's crucible steel, journals $6\frac{1}{2}$ in. dia. by 10 in. long. Driving boxes cast iron, with hard brass bearings.

CYLINDERS, close grained iron, hard as can be worked, right and left hand cylinders reversible and interchangeable. Valve face raised 1 in. above face of cylinder to allow for wear.

PISTONS, heads and followers of cast iron fitted with Dunbar packing. Piston rods, Krupp's crucible ground and keyed to cross-heads and firmly secured to piston rods. U. S. metallic packing on piston rods.

SLIDES, best hard charcoal iron.

CROSS-HEADS, cast steel fitted with gibs.

VALVE-MOTION graduated to cut-off equally at all points of stroke. Morse balance valves.

SPRINGS made by A. French & Co., best cast steel tempered in oil. Equalizing beams with steel keys.

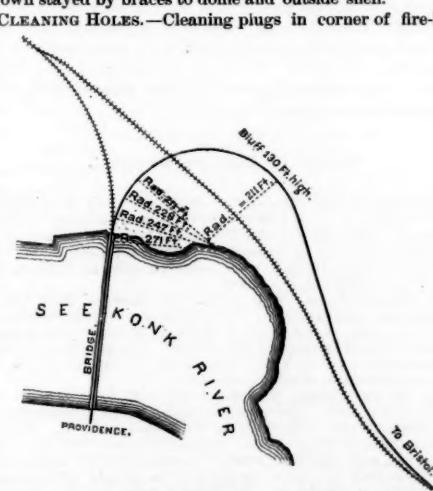
CONNECTING AND COUPLING RODS best hammered iron. Wrist pins, Krupp's crucible.

CARRYING BOGIE.

CENTRE-BEARING, six wheels of Brunswick pattern, middle pair blank, 30 in. dia.

AXLES, Krupp's crucible, outside journals $4\frac{1}{4}$ in. dia. by 8 in. long. Oil-tight boxes with brass bearings.

BOGIE-FRAME, wrought iron, with cast-iron pedestals connected together with wooden beams.



Curve on Providence, Warren & Bristol Railroad, near Providence, R. I.

hand-hole plate in front leg and blow-off cock in side or back.

THROTTLE VALVE.—Balanced cast iron poppet valve.

ASH PAN, $\frac{3}{8}$ -in. iron, angle iron corners, dampers both ends.

SMOKE STACK straight, with extension front and blow-out for ashes at one side.

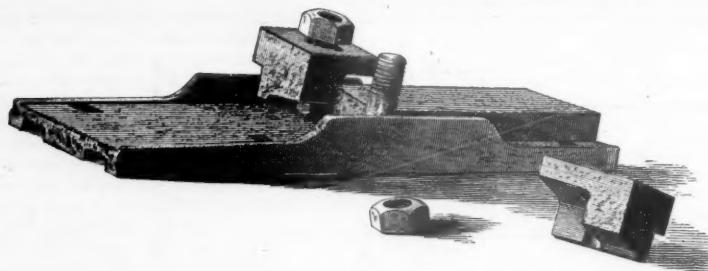


Fig. 1.

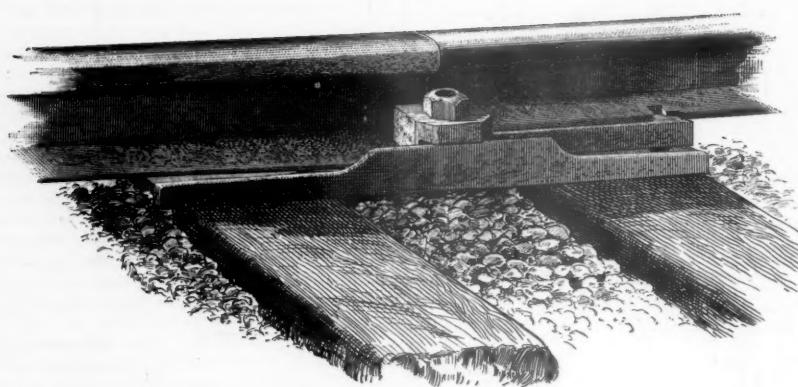


Fig. 2.

FISHER CONNECTING RAIL-JOINT.
For Connecting Rails of Different Height and Section.

TANK, strongly built, with angle iron corners. Bottom, $\frac{1}{4}$ in., sides and top, $\frac{1}{8}$ in. Capacity, 2,000 gallons.

TANK FRAME, wrought iron with cast-iron centre, connected rigidly with boiler and firmly braced.

LEADING TRUCK.

CONSTRUCTION of an original pattern. Equalized with forward drivers and adjustable, so as to prevent cutting the flanges of the tires without lifting the forward end of the engine in passing curves. Two wheels Brunswick pattern, 28 in. dia. on tread.

AXLES, Krupp's crucible; inside journals $4\frac{1}{2}$ in. dia. by 8 in. long.

ACCESSORIES.

INJECTORS, two Sellers No. 7 on R. H. side.

CAB, substantially built of hard wood, well finished and firmly bolted together.

PILOT, wood or iron. Nose 12 in. forward of bunter.

FINISH.—Cylinders lagged with wood and neatly cased with No. 12 iron. Heads cased with iron rings. Steam chests cased with iron. Dome lagged with wood, with iron casing on body, and cast-iron top and bottom rings. Boiler lagged with wood and jacketed with Russian iron, secured by iron bands.

FURNITURE.—Engine to be furnished with sand-box, brackets and shelf to receive headlamp, bell, whistle, heater blower and safety valves, steam gauge, gauge cocks, oil cans, tallow pot, etc. Also complete set of tools, consisting of two screw jacks, one pinch bar, a complete set of wrenches to fit all bolts and nuts on engine, one monkey wrench, hammer, chisels, poker, scraper, slice bar, etc.; two Williams' 23-in. headlights, two pilots and buffers, Westinghouse automatic brake for tender and train, couplings on both ends, air pump on L. H. side.

CONSTRUCTION.

All principal parts of engine accurately fitted to gauges and templates, and thoroughly interchangeable. All movable bolts and nuts and all steel or iron wearing surfaces case-hardened. All wearing brasses made of ingot copper and tin as hard as can be worked.

Engine to be handsomely painted and varnished.

Fisher Connecting Rail Joint.

There is necessarily a certain amount of inconvenience and additional expense in connecting by a common joint any two rails of different pattern, especially when they differ widely in section, as they often do. As things now are in America, it is fortunately the case that a very large proportion of the new rails laid is of a different and heavier pattern than the rail which it replaces, and the usual plan, with fish-plate connections, is to send a sufficient number of joints to the blacksmith shop and have sharp offsets or shoulders put in them at the same time that one end is drawn down or upset to fit the other pattern of rails.

This, however, is not only an expensive but an unsatisfactory process, since the fit is apt to be a rough one, while the sharp shoulders at the most strained point in the joint render them particularly liable to break.

As a substitute for this process the Fisher type of joint, which requires no fitting of the joint to the body of the rail, but only to the base, and but very little there, offers advantages which are evident enough, whatever may be one's predilections as respects the use of that joint in ordinary cases. From fig. 1, which shows the disengaged joint, it will be

seen that the only changes required in the usual form of that joint are two: first, a flat block is prepared fitting at the corners against the U bolt, and confined at the other end between spikes. It is only necessary that the height of this block shall be equal to the difference in the height of the two rails, so as to bring the tops of the two rails together at the same level, as shown in fig. 3. When the joint is screwed up this block is so firmly confined that no rattling or motion is possible, and it is unnecessary that it should be riveted or otherwise fastened to the base-plate.

Secondly and chiefly, the "fore-locks" or washer-plates which clamp the rails from above have to be specially made in a die or otherwise, instead of being merely cut off from a rolled bar. The form which these fore-locks have, for connecting rails of very different section, is shown in fig. 1, and it will be seen that they may be much more cheaply and easily made than the necessary work on fish-plates can be done.

When this is done, and the rails connected as shown in fig. 2, the joint is perfectly firm and solid, as much so as if the rails were of one section. Moreover, when the old rail is to be removed and the rail of the new section substituted, all that is necessary is to remove the block under the base of the old rail, and substitute the ordinary rolled fore-lock for the special form shown, and the joint is reduced to the ordinary form of the Fisher joint, so that the base-plate need not be removed unless desired, while the parts removed can be substituted in another joint at any other point on the track where a new connection of the same two patterns of rails is to be made.

If due economy is used in securing full wear from the old rail, it is often necessary, or at least convenient, to use a great many connecting joints of this type, as for instance at the beginning and end of curves, leaving the old rail still in use on tangents. So simple and efficient a device for this purpose as that illustrated should tend greatly to facilitate economy of this kind, which the cost of making over fish-plates, and their weakness and inefficiency after making them over, tends to impede. It is the invention of Mr. Clark Fisher, of the Fisher Rail Joint Works, Trenton, N. J., who has applied for a patent.

Repair of Cars by Contract.

A meeting of the Master Car-Builders' Club was held at their rooms No. 113 Liberty street, on Thursday evening, April 15. The subject of discussion was announced to be "Repairs of Cars by Contract, including painting and varnishing." The members were called to order at 8:25, Secretary C. A. Smith in the chair.

Mr. SMITH (Union Tank Line): All classes of cars can be repaired by contract with the workmen. When we look at what is going on out West, I think it is time the contract business should be carried into effect. I do not see any other way myself to get over the labor question, but by giving the men an interest in whatever they do.

Mr. HUNT (Lehigh Valley): I will tell how we do the work on our road. We have, for instance, two men working together on a car. They go to work and repair it. The inspector takes account of the number of pieces that are used in the job, and the men receive so much for the work. He ascertains that the car is repaired in the proper manner, and the work as it should be. Each man gets half the amount paid for the work, whatever it comes to. We have not had very much experience as yet on this piece work system, but that is the way we do it. In our own cars we have different kinds of material loose, and made to proper size, ready to fit the different cars, and all the blacksmith work is made up for them to put right on. That is done by day's work in the blacksmith shop.

Mr. SMITH: At the Meadows shops (Pennsylvania Railroad)

all repairs of any kind, down to the smallest amount, are done by contract.

Mr. FORNEY: I understand Mr. Bosdevex to that effect. I did not examine his statements very closely, but I gathered from what he said that he had systematized it down so that the smallest thing could be done. I would like to ask what the views of the gentlemen present are with regard to the way the trades-unions look upon this matter. I have had the impression that they were unfavorable to piece-work. I do not say that is a reason why we should not adopt piece-work, but it is one of the elements to be taken into consideration.

Mr. SMITH: As relates to trades-unions being opposed to such a thing as contract work, if I understand them correctly, all who have engaged in work of that kind are very decidedly in favor of it. The reason is that they can make much more money; they weed out the poor workmen, because, if there are six men, for instance, on a piece of work and one is a shirk, the other five will have to do the work and receive no more individually than the one who does but little. They will naturally decline to continue in that way, and the consequence is they will get rid of the shirk. When work is brisk they can get all the good men they want, and when it slackens up some will be obliged to lay off, but when the rush comes on they all return to work. Begin on small things and gradually extend the system to larger and more important ones.

Mr. HACKETT (New Jersey Central): You might be placed where you would have to take the big ones first. We have been trying to see what the different jobs cost.

Mr. SMITH: I should think that at least a majority of all the parts of repair work could be done by contract.

Mr. HACKETT: A good many shops, when slack on repairs, set up freight cars. That could all be put in as new work under the contract system, which is better than repairs. We never built any freight cars by contract. We keep a good many men, and when work gets short in one department we set up freight cars. We have kept a number of men for engine repairs, and when work is slack in that department put them on freight.

Mr. SMITH: Work given out by contract makes better men.

Mr. LEIGHTON: The man who does the least work always wants the most pay. I do not think we could ever get a scale of prices that would suit every man in the shop. Car repairing may in the far future be done by contract on a scale of prices.

Mr. FORNEY: The arrangement of this matter is one which calls for special qualifications. A man must have practice and experience which can only be gathered in the shop, and in the doing of the work. It is one of the things, more than anything else, which cannot be evolved from one's inner consciousness. You must go in and talk with the man in the shop. I agree with what has been said here this evening with regard to the advisability of adopting piece-work, as far as the effect upon the men is concerned. If a man has a motive for doing his work in a manner in which he will get the full benefit of all the work he performs, the effect upon the whole class would be to make of them better men. In the matter of running locomotives, which has been up year after year before the Master Mechanics' Association, a system has been adopted by some roads of offering a premium to the man making the most favorable showing—burning the least coal, for example. Now, the difficulty is this: One or two men, or a few men, manage, by very superior intelligence and skill, to get the premiums every month. The result is the others do not try. The Pennsylvania Road has adopted a different system. They give the men the advantage of any saving in fuel they may make over a certain limit. I believe some men get premiums of only 3 to 8 cents a month, and some get a great deal more. The best man may get a good deal and the poorest nothing, but they have the benefit of it if there is anything. I should think the natural effect would be that the men in the shops would also work very much in the same way. There is this question of trades-unionism. I do not want to create the impression that I have any great objection to a trades-union—probably if I was a workingman I should be a trades-union man—but one of the objects which they have tried to carry out has been, at least, in some cases, that the poor man should get as much as the best man. The piece-work system would be destructive to that. The underlying feature of the piece-work system is that a man gets paid for the work he does. If the trades-unions are at all wedded to that idea of giving the poor man as much as the best man, I think they would oppose the piece-work system. My own conviction is, that it is a mistaken policy upon the part of the trades-unions people. Trades-unionism does not strike me as being either good or bad. It is good when they do wise things, and bad when they do unwise things. It is like many other things. I think the general effect of trades-unionism has been favorable, and will continue to be favorable. There are certain questions which have come up, and do come up from time to time, which are settled and decided. I can remember when a committee from a trades-union would not be received by many people. Now that has been materially changed. My own conviction is that it is a great piece of injustice on the part of the employer not to receive or hear a committee in a proper and respectful way who come with proper grievance. There is another question that has come up and that is the trades-unions propose to dictate to the Third Avenue Co. as to the employment of certain men with whom the company have no fault to find. My own conviction is that that right will be resisted to the utmost in this country and the trades-unions will ultimately be beaten on that. It is certainly a great piece of injustice upon the part of any set of men to say who shall be employed and who shall not be employed. My own views of the matter are that there will be a great contest over it, and that finally the trades-unions will have to surrender that principle.

Mr. WILLIAM J. RICHARDSON (Atlantic Avenue Railroad, Brooklyn): I was much interested when I received a notice of the meeting and saw that the subject for discussion was repairs of cars by contract. Our cars are tied up, and we know a little about strikes. I had hoped that possibly there would be something said in regard to the repairs of cars by contract on steam railroads that might be transferred to our smaller street railway business. Mr. Forney touched upon the subject of strikes. I do not quite coincide with Mr. Forney's views on trades-unions. On our road we are led around by the nose now in a way that, to me, certainly is very humiliating, by one of these trades-unions, namely, the Knights of Labor. It is a proper thing always for an employer to consult with a committee of his own employees in regard to any question of grievance which the men may feel that they have relative to the way the business is prosecuted in which they have anything to do. But the admission for a moment of the interference of an outside, irresponsible labor organization such as the Knights of Labor, is simply to put yourselves in their power and to have your hands completely tied. Now what is our experience in Brooklyn? We at the outset were given to understand that while it was not an organization that was subject to the law directly—that is, incorporated by any state law—still it had a substantial, and, to all intents and purposes a very powerful bodily existence. Jay Gould has never been a pet admiration of mine, but I must say that he and Mr. Hoxie have risen immeasurably, in my estimation, within

the last month. He has dealt with the question in just the way it should be handled. Had we understood in Brooklyn that this organization was not what it pretended to be, but is what it is, namely, a combination, a great labor organization, with two or three men at the head of it with brains, and the rest with little or no good judgment, all of them desiring something, not exactly knowing what, beyond the mere fact that they wanted an increase of wages and a decrease of hours, we should have had the courage and the wisdom at the outset to have let our roads be tied up. The executive managers of the street railways in the cities of New York and Brooklyn hesitate to have a road tied up. We submitted with as little grace as we could, not wishing to have a strike occur, thinking that they had much more power in their organization than we have discovered. The result has been that now they have demanded, and pretty well succeeded in their demand, that every employé that we discharge shall have his case, whatever it may be, brought before their committee, and the justice of it passed upon by the Executive Committee of the District Assembly of the Knights of Labor. Certainly, it is a most humiliating position in which to place a manager, and from personal experience I cannot see any lasting harmony, but trouble is bound to crop out now and again. There can be no lasting peace between an employer and the employé when there is a lack of due and proper respect which an employé should give to an employer. There is an utter absence of that, I am sorry to say, between the employés of the street railways and their employers now. I do not hesitate to say that this thing will go on from bad to worse until they make this demand upon us, namely, that no one that is not a Knight of Labor shall be employed by the companies. Therefore I speak feelingly when I oppose Mr. Forney's views that we should treat with any committee of outsiders on behalf of our employés. I say never open that door. Always treat with a committee of your own employés; receive them courteously, as gentlemen; consider their grievances, but never for a moment allow an outside organization to dictate or to interfere, or attempt to direct in any way, your business management. If you do, just as surely your experience will be what ours has been, namely, a disagreeable and insufferable interference with your rights of management by your employés; and to such an extent that a one's manhood is compromised.

Mr. FORNEY: I will try and put myself right with the gentlemen here and Mr. Richardson. I did not mean to say an employer should receive a committee of outside men. I do not by any means say that it should be the case; but I say that a committee of your own employés should be, if they have a grievance, received courteously and given a hearing. I do not go further than that, because I can very readily see the great evils which would come up under that. I do not either say you should not receive a committee outside. It should be governed by circumstances. In regard to trades-unions generally, I would say that they are doing a good many unwise things, and do not hesitate to say that they have done some good things. But the experience in England, where trades-unionism is older than it is in this country, is that when the trades-unions become pretty well off the strikes cease. My own view of the matter is that trades-unions will continue to improve. They will probably do a good many foolish and unwise things, but the training they get is a good one, and I think that good will ultimately come out of it. It seems to me that the whole matter depends very much upon the management whether it is a good thing or an evil thing. I will say one other thing, that the conflict of labor and capital seems to be one of the unwise things in society which it is utterly impossible to get rid of, and it will have to be met as we meet a great many other things in this life.

Mr. SMITH: I should hardly think that the trades-unions of England could be compared with our own western ones, at least. There the people are of one class. Our trades-unions, if I understand it correctly, are mixed up with representatives of all nations, all kinds of languages—a different class of men entirely—that cannot be directed or controlled; but I should judge the men in England might be controlled. I think that there should be a great deal of consideration given to the working man. It is a hard life and they should have every benefit given to them that possibly can be given, and treat them well as Mr. Forney says. Many of these men in the strikes do not know what they are doing. When we have such a class of men as I take it there is in St. Louis, there is only one thing that you can do with them—I won't say what that is because they are not intelligent men. If we interest our laboring men as we have talked, give them an interest in all their work—repairing by contract—we stop these troubles.

Mr. LEIGHTON: I suspect that this matter of piece work would not bring peace in the family. Saturday evening last I was at home and was visited by a young man who was out on strike. He is a resident of New Haven and a carriage-maker by trade. In conversation with him I learned that he was, or had been, on piece-work, but could not make nearly as good wages as formerly. He gave me the scale of prices and he told me that it had been reduced from time to time until now it was very low. Perhaps a man is on the piece-work system and his employer thinks that he is making too much money. I think it will operate that the employer will cut that man down a little; it is human nature. I am not opposed to the piece-work system and I am not opposed to anything. I am looking at this subject with all the intelligence I have got, but I declare I am surprised, and I think I shall peg out before it is anything like settled.

Mr. SMITH: It looks to me as if these men in the strikes were standing in their own light. In almost every place where the union men run things to suit themselves contractors are afraid to take work. I know of a number of contracts that have been given up because the men did not know what labor was going to do. I think the roads and others should look to men that have some intelligence as their leaders and treat with them. The majority of them, and a very large majority, probably 19 out of every 20, are led by some bad man. If this bad man was out of the way the men would go to work, and the more work they have the more you have got to give. The more contracts that are given out the more there will be to give out and the men will know just what they are going to do. A railroad company would want to be very careful in the present state of affairs to know how to act. I have probably in my time seen as much of strikes as most anybody, having been connected with a road that had for 20 years strikes not quite monthly, but pretty near it. In my department, which employed as high as 1,200 men, I never had a strike; I found a strike there when I took charge, but I carried the department on by making myself familiar with the men. If a man is a bad man, get rid of him. If he is a man that will make trouble, get him out of the way, but treat the men just as well as they can be treated. You can get along better that way than in any other.

The discussion was then closed.

Mr. SMITH: A railroad company has offered free transportation to Niagara Falls and return, for any master car-builder, members of the Association, and their wives, who wish to attend the Convention. All wishing to avail themselves of this offer will please give me early notice, that proper arrangements may be made.

The meeting then adjourned.

Contributions.

Form of Bond for Brick Arches of Tunnels.

To THE EDITOR OF THE RAILROAD GAZETTE:

The ring bond for tunnel arching has become so much the customary form, that with many practical constructionists no other bond is thought of. Frequently, however, some engineer with a fondness for invention or for mechanical combination will hunt for something apparently better. The permanent and temporary difficulties and defects arising from other forms of bond are so important that a statement of them may prevent trouble in a dangerous branch of construction, where invention should deviate most slowly from established methods.

The other forms of bond most frequently attempted in tunnel arching are the Flemish, with alternate headers and stretchers; the English, with alternate courses of headers and stretchers; and the American, with the face showing no headers, but with half width stretchers permitting headers in the heart of the wall, to bond the face to the wall. All of these forms show radial headers, as contrasted with the ring bond. The following points are in favor of the ring bond and adverse to the other forms:

1. The almost universal adoption of the ring bond in the more important constructions, both in Europe and America.

2. The ring bond gives 4-in. toothings for connecting with succeeding sections; the other bonds give only 2-in. toothings along much of the outline.

3. Other bonds than the ring bond cause wide joints, because of the radial increase and because the various dimensions of brick (plus joint thickness) are not even factors. Thus too much cement is used, headers may be forced out from the rear courses, and general weakness be caused from wide joints. In the ring bond every course is as closely laid as the soft course. In fact, with ring bond, arches have been laid dry, merely flushed with dry sand.

4. Other bonds than the ring bond come nearer to giving a continuous water way by joint from rear to face.

5. They will allow a section under the crown bars, or in any place under special pressure, to be detached and forced inward along lines of continuous joint.

6. The concentric arches of ring bond distribute the pressure over a greater surface and equalize any special strain.

7. The headers, being at right angles to the thrust in such distribution, create a leverage tending to injure the arching at the inner end of header; or else the headers tend to break.

8. From the nature of an arch no binding by headers is needed; bricks should get away neither from intrados nor extrados, if properly laid.

9. There is less danger of poor work in ring bond in tunnels than with any other form of bond.

10. Much greater speed is possible with ring bond.

11. Other bonds than ring bond requiring "rubbing in" with some of the brick to secure full joints. This is difficult from the tunnel extrados, and not practical in cement as in lime mortar, and in wet places.

12. In Flemish bond some joints in tunnel arch cannot be flushed full.

13. If the cement becomes soft in wet tunneling, and does so unevenly, the brick settle unevenly towards the intrados, and the rear of headers and of stretchers will not lie in one plane; thus carrying pressure upon a few points in the rear instead of evenly, and forcing a section inward.

14. Each ring can be set and backed with cement, keeping the work from getting soaked, and enabling the water to be worked ahead towards the toothings and off of the arch under construction.

15. The ring bond can be driven ahead in runs of water, where it is impossible to continue work in any other bond.

16. In the invert, with ring bond, the lowest course can be run well ahead as a lagging, keeping back the water and muck, permitting the rapid construction of the other courses, and keeping the work from getting water soaked.

ARCH. A. SCHENCK.

The Early Days of Steam Excavators.

To THE EDITOR OF THE RAILROAD GAZETTE:

Having seen of late in your valuable paper a good deal in regard to steam excavators, I wish to give the public some of my own experience. I do not know of any man living who has had more and longer practical experience in steam excavation than myself, either in operating or in building and rebuilding. I was employed by Messrs. Carmichael, Fairbanks & Otis on the Boston & Albany Railroad, in Springfield, Mass., in the spring of 1837, and operated one part of No. 1 excavator a part of the season, when it required three men to handle it. The next year, after the Springfield cut was completed, the excavator was removed to Westfield, Mass., where it was engaged in excavating some very heavy sand hills, and was at that time operated by an older brother and myself, it having been arranged to be operated by two men. On this work the No. 1 excavator did the biggest work it ever did, loading from 700 to 800 cubic yards per day, and often as high as 1,000 yards. We were often highly commended by Mr. Otis himself on the splendid performance of the excavator, and it was during the progress of this work, and before it was fully completed, that Mr. Otis died, Nov. 13, 1839, at the early age of 26 years.

No. 1 excavator finally went to New Hampshire, when I lost track of it. No. 2 (built at the same time) worked at Worcester and Westfield on the Boston & Albany Railroad and from there it was taken to Washington Summit, the famous deep cut on the Boston & Albany, and from there it went to Brooklyn, N. Y., and was employed in cutting down the hills and filling up the low grounds about the city, and

remained there until 1843, when it was taken to Canada on the deep cut of the Welland Canal, which Messrs. Carmichael & French had a contract to widen. I was sent there with it from Brooklyn, and remained there seven years. The excavator was put to work in the winter of 1843-4 in the bottom of the canal, but it proved to be a very expensive way of doing the work, as the material all had to be taken over the banks of the cut, which was about 60 ft. high. It was thought best to make a dredge of the excavator, and put the machinery on a boat, and mud scows were constructed with side doors to take the material from the dredge into overflowed lands caused by the back water of the canal. We thus, in the year 1844, built the first swing crane dredge ever built in America, and the first that we have ever heard of in any country which had a single dipper and swung a crane from the centre.

I afterwards worked two excavators at Suspension Bridge, grading the depot grounds for the Great Western Railway on the Canada side, and dumped about 300,000 cubic yards of earth over the precipice into the Niagara River. Thence, in the fall of 1856, I moved one of my excavators out on the Hannibal & St. Joseph Railroad, about 700 miles by rail and 40 by teams, and worked it there for nearly four years, and then changed it into a quartz mill and took it to the Rocky Mountains near Denver, where I worked it for two years. In 1861, Mr. Isaac Otis and myself took a contract to excavate a large quantity of material at Bergen Hill for filling the grounds of the Erie Railway. There we rebuilt an excavator and put in an iron mast and an iron-clad frame, and did the best work of any excavator up to that time. I afterward built five dredges for the Ohio and Indiana canals, which have worked successfully for a good many years. In the winter of 1877 I conceived the idea of building an excavator that could be mounted on a common flat car, to be self-propelling, with an adjustable jack arm to be folded up (and the crane lowered) when moving over the road, and succeeded in getting one up. I made a contract with the Flint & Pere Marquette Railway to load a quantity of earth for them for filling trestles and ballasting, and it proved quite successful; so much so that I built a second one and sold it to the Pittsburgh & Lake Erie Railroad, having made some improvements. I then saw another improvement that was wanted, a higher crane, provided with an arrangement for lowering down to pass low bridges. The arrangement proved a success. I then started to build iron cranes and iron masts, and make other improvements, putting in independent swinging engines and other small engines on the crane for handling the movement of the dipper. After building several excavators and making numerous improvements, and having at this time built 32 excavators and 18 dredges, I can say that there are dredges built after my plans working now, that can excavate 2,000 yards per day in 12 hours, and excavators that can and have loaded 8 yards per minute upon cars, and have a record of 1,650 yards per day for a month, running only 6½ hours each day. The cost of running this excavator for coal, oil and waste and foremen was \$16 per day, or less than 1 cent per cubic yard. I propose to build excavators of wrought iron and steel that will dig anything except solid rock.

Among other excavators built at an early day, I superintended building one in South Boston for Chas. H. French, in 1849, to go on the Norfolk County Railroad in Massachusetts. About this time the firm of Eastwick & Harrison, of Philadelphia, built one or two; one was sent to France, I think, for the firm of Peto, Brassey & Co. My brother went out with it and remained there three years.

H. T. STOCK.

THE SCRAP HEAP.

Epitaph on a Corner.

A majority of the English and German steel-rail makers have for some time formed a combination to keep up prices, and pool and share orders in certain proportions mutually agreed upon. Trade continuing bad, a dissolution of the combination became inevitable, and that event is to take place on May 1, when the price of rails is expected to drop 2s. 6d. or 60 cents per ton. This sad event has called forth the following from our contemporary *Iron*:

AN EPITAPH.

Sacred to the Memory
of the

INTERNATIONAL STEEL RAIL MAKERS' ASSOCIATION,

Born January, 1884, died April, 1886;

The Daughter of

GREAT INCOMPETENCE,

By his Wife,

BLIND FOLLY.

She Suffered from her Earliest Days from

a Malignant Type of

GERMAN MEASLES,

Aggravated by a Chronic Attack of

ENGLISH CHOLERA.

Her Teething Brought on Severe

INTERNAL CONVULSIONS,

Which Ended in her

DISSOLUTION,

To the Great Joy of Her Enemies

and

The Greater Relief of her Friends.

Farewell, dear friends, nor deem my short life wasted;
Monopoly's sweet fruits through me you've tasted,
Be not too hard upon my little vices,
For while I lived, I helped to keep up prices.

Regulated Themselves.

A member of the Legislature who introduced a bill entitled "An Act to Regulate Railroad Fares in this State," soon received a call from a gentleman who introduced himself as the president of a leading railroad, and added:

"Here is a pass for you over our road for five years. * * * Your bill. Ahem! Will it be pushed?"

"Pushed? Oh, no! The fares seem to have sort of regulated themselves."—*Wall Street News*.



Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies through letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE CHESAPEAKE & OHIO REPORT.

The Chesapeake & Ohio Railway Company presents its report for 1885 in a new form, which is in many respects admirable, giving some information of great value not usually contained in reports, and some important data for a series of years, so that the persons interested may know what course the property has been taking.

The story which the report tells is not altogether an encouraging one. The Chesapeake & Ohio Railway is a tolerably valuable property, but its capital account, and especially its funded debt, is much too great. The company owns 5104 miles of railroad, while its capital stock is \$34,832,373, its funded debt \$32,835,474, and it has other liabilities in excess of corresponding assets amounting to \$1,620,813. The cost of road and equipment on the balance sheet is \$187,255 per mile of road and \$102,991 per mile of track, while the New York Central, with its immense equipment, city terminal grounds and stations that have cost many millions, and four tracks, stands at \$170,052 per mile of road and \$58,000 per mile of track, in stock and bonds.

The gross earnings of the Chesapeake & Ohio are about at the rate per mile of the larger roads west of Chicago, which make good returns on a capital of \$35,000 to \$50,000 per mile; but its net earnings are not so large, having for the last four years varied from \$1,965 per mile (last year) to \$2,554 (in 1883), and averaging \$2,221, while the net per mile of the Chicago, Burlington & Quincy were from \$3,510 (in 1882) to \$4,005 (in 1883), the Chicago & Northwestern's from \$2,650 to \$3,641, and the Milwaukee & St. Paul's from \$1,908 to \$2,172, the latter having an immense mileage of new road in new country, and a capital of about \$38,000 per mile.

The Chesapeake & Ohio is not so easy to work as a prairie road, having heavy grades. The expense per train-mile is very small, it is true, varying from 68¢ to 59¢ cents in the last four years, but the train-loads are small too—last year averaging 28 passengers and 155 tons of freight. The Erie last year spent \$1.01 per train-mile, but the average load was 46 passengers and 252 tons of freight. The great bulk of the Chesapeake & Ohio freight is down the chief steep grades, and it is the lack of a west-bound traffic, probably, which makes the freight-train load so small. There were last year 566 ton-miles east to 100 west. Of the total freight movement no less than 56 per cent. was coal, 18 per cent. other local freight and 31 per cent. through. The through tons west were 104,443, which is a respectable amount—equal to the total New York through shipments over the trunk lines last March. The through freight east was 2½ times as great, but not as much as 4 per cent. of the through movement to the seaboard over the Northern trunk lines. The currents between through freight in the two directions appear to be more nearly equal than on the trunk lines.

The through freight and the coal have to be carried at extremely low rates—last year, when they made up 87 per cent. of the total freight movement, for 0.448 cent per ton per mile for coal and the same for through freight. Thus, though the local freight yielded 1.246

cents per ton-mile, there was so little of it that the average for all freight was but 0.548 cent, against 0.672 cent in 1884—and against 0.656 on the Erie and 0.68 cent on the New York Central. The density of the traffic (freight) was about 2½ times as great on the Central as on the Chesapeake & Ohio, and yet the Central could not earn dividends at last year's rates. It will hardly be credited that per mile of track the traffic was nearly as dense on the Chesapeake & Ohio as the New York Central, being equivalent to 1,077 tons each way daily over the entire track of the Central, and to 979 over the Chesapeake & Ohio. There is no such comparison between their passenger traffic, the Central having 17½ times as much as the Chesapeake & Ohio on not quite twice as many miles of railroad.

The growth of traffic on the Chesapeake & Ohio was quite rapid until 1883, but only moderate since. In millions of ton and passenger miles it has been:

Millions of	1878	1879	1880	1881	1882	1883	1884	1885
Ton-miles	152.9	167.8	230.2	293.1	343.5	426.3	406.0	480.2
Pass.-miles	9.3	9.8	13.6	20.1	24.0	29.3	27.2	25.1

From 1878 to 1881 the freight traffic nearly doubled and the passenger traffic more than doubled. From 1881 to 1885 there was a gain of 60 per cent. in freight and 25 per cent. in passengers. Unfortunately the large gains were most of the very low-rate traffic. The 298 millions of ton-miles in 1881 yielded a little more earnings than the 480 millions in 1885. Apparently the company has sought primarily to develop a traffic, without regard to profit; for it is difficult to believe that there was any profit or that there was not some loss on the east-bound through freight carried at 0.433 cent and the east-bound coal carried at 0.443 cent per ton per mile last year, especially as probably nearly all the coal cars went back empty. This also is indicated by the net earnings, which were 13 per cent. less last year than in 1882, though the freight traffic has increased 39 per cent. and the passenger traffic slightly meanwhile. These net earnings have been:

1878	.....	\$341,621	1882	.....	\$1,032,528
1879	.....	384,209	1883	.....	1,306,858
1880	.....	569,228	1884	.....	1,038,861
1881	.....	632,538	1885	.....	895,423

Of course if interest on the whole of the immense funded debt had been obligatory, the company would have been bankrupt long ago. The largest net earnings have been but 4 per cent., and last year's were but 2½ per cent. on this debt. But until 1881 interest was required only on \$4,279,000 of bonds. In 1881-82, 3 per cent. in cash was promised (and paid) on \$15,000,000, and this was increased to 4 per cent. the next year, after which 6 per cent. has been due. It was paid in 1884, but only half of it last year, and it left a deficit of \$876,096 in 1884, and one of \$465,886 last year: that is, the company has incurred a floating debt to pay the interest. The deficit last year was nearly three-fourths of it due to the payment of disputed claims properly chargeable to previous years.

In view of the failure of the company to earn enough to pay interest on the "Series B" bonds, the President recommends holders of these bonds "to provide for the liquidation of the floating debt, and at the same time reduce the rate of the interest on their securities by bringing the interest liabilities within the earning power of the road"—a duty which the stockholders should be called upon to perform.

THE MANUFACTURERS' BRIDGE SPECIFICATIONS.

While the idea of a uniform specification for the material and workmanship of metallic structures is one of the plainest good sense, in the interest alike of seller and buyer, it is to be feared that the late convention at Pittsburgh, in which the manufacturing interest predominated, has done much less than was hoped to bring this about. For this very reason, however, railroad engineers and others who have no individual axe to grind, but desire only to facilitate turning out cheap and good work, should not permit the movement to go by default through their indifference, but rather assist in it, by giving careful consideration to the amendments which the interests of buyers, and in fact, one may say, of both parties demand.

The proposed standard of the manufacturers, as it now stands, seems deficient in many important particulars. In the stipulations for wrought iron, the evasion of the usual demand for what is known as "double-refined iron" is not only manifest in the second clause, where-in all reference to process of manufacture is prohibited, but also in the schedule of tests, from which has been omitted the only test for uniformity which it is possible to have. Agreeing as we do with the manufacturers and the most experienced engineers, that the selection of processes and modes of manufacture should not be hampered by the engineer, who only has to do with results and with physical require-

ments, we should not be understood as adversely criticising the spirit of the second clause; but for many years it has been the custom in most first-class bridge specifications to call for double-refined iron, and among the physical tests, to require both a quick and slow fracture test, the former breaking a specimen short off, exposing the grain, and the latter breaking it so as to develop fibre.

It is well known also that for many years the intense competition among the manufacturers has led them to pay little or no attention to the above requirements, which involves a matter of some ten dollars or less per ton additional cost. This has resulted in more or less friction between manufacturers and engineers, sometimes resulting in condemnation of work, but more often resulting in overlooking the defects either through pressure for speedy delivery or on the supposition that the specifications had been adhered to as "forming part of the contract." Apparently on this ground the "proposed standard" frankly takes this question in all its bearings entirely out of the hands of the engineer, who is to accept his material on tests for ductility, elasticity and ultimate strength alone.

Now, there are many engineers, and we think the manufacturers will not rapidly reduce their number, who regard uniformity of material as a very important physical quality, and they do not care to be ruled out from making such tests as they deem necessary for the purpose of judging of that uniformity. Inasmuch as uniformity is purely a matter of refinement, having nothing whatever to do with character of original stock, which determines questions of strength and fitness, it would seem a prudent precaution to make special provision in any standard specification for the use of double-refined iron. While poor original stock never can be refined to good structural iron, it is likewise true that bars produced from the best stock for such purposes may lack sufficient refinement to be safely used. Therefore, the fracture tests, whereby crystallization and fibre may be judged, become all-important, as also the behavior of the specimen under the elastic and ultimate strength tests, where reasonable uniformity in proportionate stretch from point of fracture to the clamping shoulders at either end should be exhibited. Since a certain percentage of the factor of safety adopted for a structure must belong to imperfection of material, it would seem that double-refined iron should be allowed a higher working strain than single-refined, in proportion to its greater freedom from irregular crystals or raw spots. It would, therefore, seem far wiser that in any standard specification a frank recognition should be given to the two classes of iron, "single" and "double"-refined, leaving to the engineer or other purchaser the option of choice between those two grades, at their relative differences of cost. There is a certain plain advantage in doing so, because of the different requirements of different kinds of structures. In short-span bridges it is rather an advantage than otherwise to use a poorer iron and more of it, because of the added weight. In long-span bridges, on the contrary, every ounce of surplus weight takes another ounce to hold it up, and is of all things to be avoided. To specify but one kind of iron for all kinds of iron, therefore, is not reasonable, even if practicable.

In their recommendations for a standard quality of plate and shape iron, we imagine the manufacturers will have few followers among the engineers, and it would be interesting to know just what sort of stock the manufacturers desire to have the freedom to use. The elongations provided for such material are absurdly low, permitting the use of brittle or improperly worked (refined) stock, such as engineers would not be justified in using in important structural members. While it is customary to proportion angle iron and plates for a lower unit strain than "bars," that custom has arisen only from the fact that such shapes are of unsymmetrical section, creating an uncertainty as to just how strain is transmitted through them and their connections, and has not arisen from any expectation of using poorer material, when compared by specimen tests. No one should expect an angle iron, beam or channel, tested to rupture through the various phases of elasticity and stretch, to show as high results as an equivalent cross-section in a symmetrical bar; but there is no reason in the world why a specimen taken from an angle-iron leg, or the web and flange of a beam or channel, should not show nearly, if not quite, as good results as a specimen taken from the symmetrical bar of equivalent cross-section. When shapes are used purely in compression, less ductility or less refined iron is perfectly permissible, but in tension members a good, uniform, well-worked iron is just as important as in bars.

Regarding tests, the manufacturers are quite right in the idea that some limit should be placed upon the

expense to which they should be put in supplying specimens for testing; but rather than set any arbitrary limit as to what iron should be tested and what number of tests should be made, it would seem wiser to leave that selection to the purchaser, letting him share with the maker in the expense.

In these and some other respects the latitude which it is proposed to allow manufacturers by drawing conclusions from tests on the doctrine of averages, reminds me of the story of the Dutch engineer who is alleged to have determined the proper height for a certain bridge over a navigable stream by measuring the height of the masts of the various vessels that would pass under it and then striking an "average" mast height to regulate his clearance!

The manufacturers have started a desirable movement, but they will do well to revise their recommendations, and if they desire the proposed standards, when completed, to meet general acceptance, the propriety of associating with them some of the prominent engineers of the country who are not contractors is evident. The commercial interest is so strong on the side of the manufacturers that acceptable conclusions which shall be above even the suspicion of bias can only be reached through some such joint action, which could probably best be reached through a carefully selected committee of the American Society of Civil Engineers.

The Strikes.

While the Southwestern strikes have assumed less importance during the past week, because all the roads are worked with something like their old regularity, with a new force of men in place of the strikers, East St. Louis is still garrisoned by the militia, and there are occasional attacks on the new men, which make it probable that nothing could be done if the militia were withdrawn. In spite of the want of success there, there are now other strikes for objects which it would be morally wrong for the railroad companies either to grant or to arbitrate about. The employés of the Third Avenue Railroad in New York, and the yard switchmen of the Lake Shore & Michigan Southern in Chicago, have struck to compel the discharge of a few men who do not belong to their Union. In New York some other complaints were preferred after the strike, but they were evidently not what the strike was for. Apparently their easy success a few weeks before had led the men to think that they could get anything they asked for. What they ask is, virtually, that the company should discharge some of its employés because they had been especially valuable to it at a critical time. This is a demand which will not bear discussion, and the company has no more right to submit it to arbitration than a man has to permit arbitrators to say whether he shall pay his honest debts. The "Empire Protective Association," which is the organization of the New York street railroad employés, requires that its members alone shall work for the companies, and demands this just as it compels its members to leave the service of companies against whom they have no pretense of a grievance, thereby proving that membership is a disqualification for their service. It certainly would be perfectly proper for a street (or other) railroad to make it a condition of employment that its men shall not leave it without notice because of any grievance of other men on another railroad. To require the companies to employ no men except those who are pledged to stop the working of their road whenever something they do not like happens on another road is too absurd for consideration, but that is just what the street railroad men have been doing.

The strike in Chicago is serious for another reason. Only a few employés are concerned in it, but they have virtually taken possession of the road and defied the whole state of Illinois, whose executive has looked on, asked them to please keep the peace, and then permitted them to disable trains as fast as they came out of the city. The strikers do not do these things within the city limits of Chicago, where the city itself might enforce the law and arrest men as fast as they meddled with the trains, but just south of the city, in the town of Lake, which has not police force enough to do anything. It was evident from the first that only the state could keep the peace there, and a respectable force would have prevented any violence, and probably made it unnecessary to make an arrest even. Then the strike could have taken its course. The impunity with which men have been permitted to seize the property of their former employers immensely increases the danger of mobs, and is very likely to result at some time in bloody conflicts, all of which must be laid at the doors of those who have neglected to execute the law promptly when it was violated. It makes no difference whether the strikers

have a just cause for striking or not; the interference with the property of their employers is a crime, and men must learn that it will not be permitted for an hour. The resort to it is very greatly injuring the just cause of employés. There had never before, we believe, been so general a disposition to admit their right to form organizations for their protection, to negotiate with their employés through their chosen agents, to state the terms on which they will work, and to refuse to work if the terms offered are not acceptable. But when, not satisfied with refusing to work, they declare that no one else shall, drive men away when they attempt to, and disable the employer's tools and machinery, indignation at the wrongs which they commit leads men to ignore the rights which they may justly exercise; and after a series of such outbreaks, both parties are further apart than ever, having taken a step backward in their realization of their respective rights and duties.

A Short Sermon on Steel Rails.

The ideal sermon is one, we take it, with a small amount of comment to a large amount of text; for the text, in any well-balanced discourse, contains the pith of the whole matter. Our text will be found in Vol. XLI., No. 15, of the *Engineering and Mining Journal*, being its last issue, as follows:

THE LARGEST STEEL RAIL MILL RECORD.

Mr. E. C. Potter, Superintendent of the North Chicago Rolling-Mill Company, advises us of the following magnificent "record":

"April 2, on the day turn we rolled 1,606 80-lb. rails, weighing 426 gross tons, and lost one hour and 35 minutes. On the night turn, we rolled 1,212 80-lb. rails, weighing 320 gross tons, and lost three hours waiting for steel and changing rolls. Total for 24 hours, 2,818 rails, weighing 746 gross tons, with four hours and 35 minutes idle time."

The month of March has placed the Pennsylvania Steel Works, Steelton, Pa., at the head of the column as the largest producing steel plant in the United States, and the record of the Bessemer mill for the month has not been equaled in this country. There was no special exertion made to accomplish the result, and only the usual complement of men was employed. The production of each week was as follows:

	Tons.	Tons.	
First week	4,527	Fourth week	4,761
Second week	4,531	Three days	2,392
Third week	4,651	Total	20,802

During the month the following large productions were made by the different turns in 24 hours: 926 tons, 857 tons, 900 tons and 854 tons.

The mill for several days did some extraordinary running, and from six o'clock p. m. on March 8 to six o'clock on March 9 made the largest 24-hour run ever made on a 56-lb. rail; 2,810 rails were rolled, making 702 tons. The mill lost two hours and five minutes in running—the actual running time being 21 hours and 55 minutes.

The Joliet mill reported, on Jan. 2, 3,000 rails, or about 900 tons, in 24 hours. If no time was lost, this is not as good as Harrisburg by say three rails an hour for actual running time.

On Jan. 28, in one turn of 12 hours, Joliet made 1,658 rails, 52 lbs., with 85 minutes spare time, and on the 29th, 1,758 rails, with 105 minutes spare time. The 24-hour work of Joliet should be given to make comparison possible.

All of these records are simply marvelous, and reflect the highest credit upon those making them.

In our text we have convincing evidence how well that body of our fellow men on whom has been placed the duty of producing vast quantities of a needed and costly product at the least possible cost of human toil and sweat are running "the race which has been set before them," as well as any one could desire. They are racing not only against time but against each other, in their efforts to practice that charity which begins at home—a charity which, in its way, is a very good kind of charity, because if men do not practice it, each for himself, civilization must sooner or later come to an end.

But not to all of us is given in charge actually to run a race. "They also serve who only stand and wait," and to some of us is given merely the humbler duty of acting as policemen, to keep these nimble runners to the straight and narrow path of decent quality, which has been laid down for them, lest they stray therefrom in their efforts to pass each other, or start off 'cross-lots toward the false goal marked (in such small letters that he who runneth cannot well stop to read without losing his place in the race), "cheapness first and quality afterwards," rather than toward the true goal, marked "cheapness AND good quality." Do we discharge this simple duty? No, verily, brethren, it is plain that some of you, to put it mildly, don't even take the trouble to know where the course is, and much less to keep the runners in it, but rather spend your time in throwing up your hat and hurrahing because the runners are running *fast*, without giving a thought to the larger question of whether they are running well.

This is not only wrong but it is foolish. It naturally leads us to inquire, first, whether there is reason to believe that this negligence is doing harm, and we find there is abundant evidence, for it is matter of common notoriety that modern rails are very much inferior to those made in olden days when rails both cost something and were worth something. It is all

but certain that the service obtained from a dollar's worth of rails is very much less now than it was then, and it is only a little less certain that this self-same haste of manufacture, over which foolish people swing their hats, is an important if not the only cause therefore, in that it does not permit of doing work enough upon the rails to make them solid and homogeneous, but rather requires that they shall at no time be cool enough to have much more than a lead-like consistency.

In view of this fact we are led to inquire, secondly, whether the record given is really an honorable record, and in view of the admitted deterioration of modern rails, we are compelled to conclude that it is not, but rather a shameful record. But when we further inquire, thirdly, on whom the shame should rest, we are driven at once to the conclusion that it should not rest on those who make the rails, because they have well solved their half of the problem of railmaking—how to turn out rails *cheaply*—and they have no means of solving the other half of the problem, whether the rails are really well suited for the purpose required other than by the only test which comes within their immediate knowledge—whether they will sell.

Since, therefore, our text shows us that rails are continually made faster and faster, and since we know by abundant evidence that they are likewise continually made poorer and poorer, and since there are strong reasons for believing that the cause of the poorness is the fastness of making, apart from the mere coincidence that the two happen together, let those of us to whom it has been given in charge not to run, but to stake out the course, be more careful hereafter to do it properly, by never failing to "prove all rails; accept only those which are good." Possibly such headlong haste of manufacture would then come to a speedy end.

Circulars of the Master Mechanics' Association.

It is a matter of great regret that the circulars of the committees of the Master Mechanics' Association receive apparently so little consideration from the master mechanics of this country. It seems as if but few of the members of the Association realized that its usefulness and prestige can only be maintained by the cordial co-operation of all. It is impossible for the Association to do much to improve our knowledge of locomotives and disseminate and exchange useful information unless every member puts his shoulder to the wheel and contributes his mite to the common fund of information. If every member would endeavor carefully to answer the circulars of the Association, giving full particulars of the points in which he has had special experience, the conventions and reports of proceedings would be exceedingly interesting and instructive.

All master mechanics attending the convention—or, if unable to do so, reading the report of proceedings—would consider that, though he had been at some trouble in preparing an account of his own experience, yet he had been amply rewarded by being able to hear the experience of some two hundred of his professional brethren, hailing not only from the most distant states of the Union, but from all parts of the wide world.

American master mechanics should bear in mind that the American Railway Master Mechanics' Association is the only Association of the kind in which master mechanics or locomotive superintendents of all nationalities can and do meet on common ground. No other engineering society of which we have any knowledge is so truly international, or excites so much interest among engineers abroad. It therefore behoves the members, for the credit and honor of this country, to take a lively interest in the Association, and endeavor to enhance its usefulness and importance.

It is, however, singular that American master mechanics hardly take the trouble to answer the circulars of the various committees of the Association, while their brethren in England, France, Russia, India, Australia, etc., take great pains to contribute full and valuable records of their experience and experiments in endeavoring to improve the locomotive. Probably there is no point about the locomotive on which Americans have such a decided superiority as balanced slide valves. In no other country do we find large numbers of such valves used with the greatest success, running an immense mileage without refacing, and effecting an appreciable economy both in consumption of steam and repairs. Yet in spite of the superior performance of balanced valves here—indicating with tolerable certainty a better method of construction and closer attention to the perfection of details and remedying of defects—the replies to the queries

of the committee on the subject seem to show that little interest is taken in the subject here, while countries that have hitherto in vain tried to make balanced valves a success on locomotives are fully alive to their advantages, and are quite ready to contribute their quota towards a discussion of the subject. While the committee has only received six replies from American master mechanics, it has received ten from Great Britain.

In other words, in America about one person in every forty has responded to the circular on balanced valves, while in Great Britain five persons out of six have replied. This is an extraordinary showing, and should be corrected at once. Fortunately, there is still time for all those who have had experience with balanced valves to answer the circular of the committee on this subject. Mr. Charles Blackwell is the chairman of this committee, and letters addressed to him, care of the Union Pacific Railroad, Omaha, will find him. The chairmen of other committees would also be glad to receive more numerous replies to their various circulars.

The East-Bound Freight Movement.

We have now complete returns of the east-bound freight movement over the trunk lines, including everything shipped from their western termini or points further west, during the month of March. It amounted to 984,633 tons. But this included the shipments over the Lackawanna and the West Shore roads, which have never been reported before. The Lackawanna began carrying in 1883, and the West Shore in 1884, and just how much they carried then we are not now able to say; but the shipments by the other roads have been:

1880.	1882.	1883.	1884.	1885.	1886.
916,756	627,389	970,448	734,866	957,156	805,097

So that they carried 152,059 (16 per cent.) less than last year, but $9\frac{1}{2}$ per cent. more than in 1884. In 1883 the Lackawanna had only begun to carry through freight and the West Shore was not yet open. The Lackawanna brought an exceptionally large amount of grain to New York in that month, however (twice its average for the year and more than either 1884 or 1885), but probably 50,000 tons fully covers all that it carried; in 1884 the average monthly shipments by this road and the West Shore were less than 95,000 tons and probably not more than 130,000 tons last year, which would make the total movement in March by all roads:

1880.	1882.	1883.	1884.	1885.	1886.
916,756	627,389	1,026,448	829,866	1,087,156	984,633

Thus, what we said last week, that the east-bound movement this year in March has never been exceeded when rates were maintained, except in 1883, is unquestionably true. That there should have been a decrease of only $9\frac{1}{2}$ per cent. from last year and an increase of 19 per cent. over 1884, while the grain rate was 15 cents per 100 lbs. in those years and 25 this, is a notable result. The earnings from this traffic were very nearly in the following proportions:

\$1,000 this year for every					
\$1,356	\$510	\$1,042	\$500	\$602	
in 1880.	in 1882.	in 1883.	in 1884.	in 1885.	

Thus the earnings this year of all the railroads concerned this year must one-half greater than last year, and twice as great as in 1884 or 1882, but slightly less than in 1883 and a fourth less than in 1880. It must be remembered also that the number of roads among which these earnings are divided is greater now than in 1883 and before. Last year and in 1884 there could have been no profit on this traffic; this year the profit was probably as much as one-third of the gross earnings. This freight moves all sorts of distances, but on the average probably as much as three-fourths or more of the distance from Chicago to New York, and if so, it should have yielded a profit this year of \$1,477,000, about half of which went to the eastern trunk lines—nearly the whole a clear gain over last year.

These figures show unmistakably that the Chicago shipments are no criterion of the total east-bound movement. It is true that we have not a complete record of the Chicago shipments since February, as the Chicago & Atlantic has ceased to report; and it is also true that there have been for two years or so shipments from Chicago by indirect lines which never have reported; but the Chicago & Atlantic cannot have carried a great deal, and the other lines still less. All that they carry (except the trifles that may go to the Chesapeake & Ohio) gets reported finally with the east-bound shipments of the trunk lines. The reported Chicago shipments last March were not one-fifth as great as the reported shipments eastward over the trunk lines, and the proportion has varied considerably from year to year. This year, apparently, the flour of Minneapolis has been withheld for shipment by Lake Superior to an unusual extent, and this has served to reduce the Chicago shipments, but not shipments from other places.

The amount of the trunk-line shipments in March fully justifies the maintenance of the 25-cent rate through that month, if anything had been needed to justify it, for we do not know as any sane man conversant with the circumstances has questioned the wisdom of it.

The total trunk line shipments eastward for the three months ending with March were 2,571,405 tons this year, 365,198 tons of which went by the two roads which have not reported their east-bound shipments heretofore. Omitting these, the shipments by the other roads for the three months have been:

1880.	1882.	1883.	1884.	1885.	1886.
2,050,038	2,042,650	2,561,027	1,857,889	2,475,051	2,206,266

Thus the east-bound freight of these old roads was larger this year than in the days before 1883, when they had the whole of it, and but 11 per cent. less than last year, when the rates on most of the freight were considerably lower than this year, and in reported years when rates were maintained exceeded only in 1883. This movement was not reported in 1881, but it was very large then. The rates last year and the year before began at 25 cents, but went down irregularly until a 15-cent rate was made general in March, so that the difference between the average for the three months this year and in those years is not nearly so great as for March alone. The profit on the business was very much greater in 1880 and 1881 than in any year since, but much greater this year than in either of the two previous.

The prospect for the season of navigation should be considered in the light of the above figures. As the total business has continued large in spite of the decrease in Chicago shipments, and as we know that a great corn crop remains to be moved from a territory which does not ship much by way of Chicago, it is at least possible that after navigation opens and with the 25-cent rate maintained, there may be a very considerable eastward movement. There was in March, with little going from Chicago, and there may be in succeeding months, with still less going from Chicago; and at a 25-cent rate there will be a respectable profit on the business, which is very much needed.

Prussian State Railroad Rates and Traffic.

The report of the Prussian State Railroads for the year ending March 31, 1885, is of great interest, and on the whole decidedly creditable to the management.

The Prussian State Railroads included 19,498 kilometres (12,010 miles) of road for the year in question, as against 15,489 kilometres (9,620 miles) for the preceding year. Practically all the lines are of standard gauge. In order that their comparisons with previous years may be of real value, they have given figures, not merely for the total system, but also for the part which was operated by the state during the fiscal year preceding.

The cost per mile was about \$109,000. This probably does not represent actual cost, but cost to the state—is on the whole, therefore, a little too high. The income on this investment, making proper allowances, is about 5 $\frac{1}{2}$ per cent.

The gross earnings were somewhat under \$13,000 per mile—an increase of 2.1 per cent. over the previous year. This increase was due more to passengers than to freight. The expenses were about 57 per cent. of the gross earnings, and had increased only 1.2 per cent. over those of the previous year, giving an increase of net earnings per mile of nearly 4 per cent.

Of the gross income, 24.9 per cent. was due to passenger traffic, 69.2 to freight and 5.9 to miscellaneous sources.

In the passenger business, third and fourth-class traffic is developing at the expense of first and second. The following are the percentages:

	Of income.	Of passengers.	Of passenger-miles.
1st class	5.3	0.9	2.2
2d	24.2	11.6	16.9
3d	42.7	54.3	41.9
4th	21.2	30.6	33.5
Military	2.6	2.6	5.5

The average distance traversed by each passenger was about 18 $\frac{1}{2}$ miles; the average rate per passenger, mile about 1.8 cents. In this country in 1883-84 the average journey was 26 miles, and the average fare 2.36 cents.

The average distance over which freight was carried is about 50 miles; the average receipts per mile a trifle over 1 $\frac{1}{2}$ cts. per ton of 2,000 lbs. Here the average haul is 114 miles, and the average rate 1.12 cents per ton per mile.

At the rates of the Prussian State Railroads the earnings from the traffic of the United States railroads in the last year reported would have compared as follows with the actual earnings:

	By Prussian rates.	By actual rates.
Passengers	\$114,000,000	\$206,790,700 or \$92,790,000 less.
Freight	500,350,000	502,869,910 or 93,180,000 more.

So that the total earnings would have been nearly the same, the loss on passengers just about balancing the gain on freight.

The classification of the freight is quite noticeable. Let it be observed that the German "special" classes correspond to our "car-load" rates, while the German "exceptional" tariffs correspond to our "special" rates, except that they are in no case secret.

	Per cent. of	Income.	Tonnage.	Mileage.
Express	2.7	0.4	0.5	
Parcels	14.6	4.3	4.7	
Car load and special	36.9	36.7	33.7	
Exceptional	45.8	58.6	61.1	

The striking thing is that after all that has been said about equal mileage rates in Prussia, and about the systematic treatment of rates, three-fifths of the freight should be moved at rates which are avowedly exceptional. And while the percentage of tons of such goods tends rather to diminish from year to year, the per cent. of ton-mileage has increased—showing, if anything, an increasing disposition to favor the long-distance traffic, or, perhaps it would be better to say a greater development of the long-distance traffic than of the local traffic under these rates. The average rates for this "exceptional" traffic are just about one cent per ton-mile—equal to 45 $\frac{1}{2}$ cents per 100 lbs. from Chicago to New York by the shortest line.

These figures furnish a sufficiently striking commentary on the notion that it is possible to make rates uniform by state authority.

The through rates per mile by the Prussian railroads, however, vary much less from the local rates than in this country, and especially than on many Western and Southern lines in this country, which, with average rates necessarily much higher than those of the trunk lines between Chicago and the seaboard, still are forced to accept trunk line rates for some of their through freight. In Prussia the virtual concentration of all the railroads under one management prevents the undue reduction of through rates by the competition of railroads, except for a very little traffic, like that from Channel or North Sea ports to South Germany or Austria, which may be diverted by Dutch, Belgian or French ports and railroads; and there the most important of all our checks on through rates—the competition of vessels on the great lakes and rivers—has nothing to parallel it, the boats propelled by cable towage on the Elbe, etc., affording nothing like the cheap transportation of our lakes, the Mississippi, the Ohio and the Hudson. But it is altogether probable that the through Prussian rates are higher than would be for the interest of the traffic of the country considered by itself. In many cases they are purposely kept high as a sort of protective tariff—to prevent Russian and Hungarian grain and Austrian and Hungarian timber from competing with Prussian produce to the extent they would do if the Prussian through railroad rates were adjusted so as to produce the largest net income. The natural tarification would reduce rates on the foreign traffic, greatly increase its quantity, and draw from foreigners a larger part of the net earnings required to pay the interest on the cost of the railroads; but it might also reduce the price of the produce of Prussian landed estates, which the nation has a right to bear in mind when it manages the railroads. It would seem, however, that a *transit* tariff, applying only to freight coming from one foreign country and going to another, might be made which would bring a large part of the Russian and Hungarian grain to Baltic and North Sea ports, over Prussian railroads, without admitting it to competition with Prussian grain more than at present.

The New York *Tribune*, commenting on our remarks on the importance of the trunk-line through freight, continues to calculate traffic by the number of tons carried, making a car-load from New York to Newark, six miles, the equivalent of a ton from New York to St. Louis, 1,060 miles. No such comparison has any value. It is true that reports seldom give the earnings from through and local traffic separately, but there are some which show what a very large part of the earnings of a road may be due to its through business. Thus the Michigan Central in 1883 [Report for 1884, page 14] earned \$5,896,802 from local and \$8,635,563 from through freight, the local tons being nearly three times as many as the through. From through passengers and freight it earned \$4,312,154 gross, which was nearly a third of the total. In 1884, with the ruinous through rates of that year, it carried 84 per cent. more through freight, but earned \$859,930 less for carrying it—very serious loss, equal to one-fifth of the net earnings of 1883 and to \$4.60 per share of the company's stock.

The Cleveland, Columbus, Cincinnati & Indianapo-

lis Railway also reports the earnings from its through and local traffic separately. In 1883, two-thirds of its freight earnings were from through freight, and in 1884 this part of the freight yielded \$416,000 less than in 1883, \$395,000 of which was due to lower through rates, and this was equal to \$2.63 per share of the company's stock, which is just 63 cents more than the stock has received for the last five years. The decrease in these earnings from 1880 to 1884 was \$499,756; from 1882, only a few hundred dollars less. That this and the Michigan Central are not dividend-paying roads is unquestionably due to the unduly low rates they have received on their through freight.

When it was decided last week not to reduce the east-bound freight rate from the 25 cent basis from Chicago to New York, which has been in force since November last, the Chicago *Tribune* reported that this was imposed by the trunk lines on their western connections, which were also spoken of as the "serfs" of the eastern trunk lines, leading one to suppose that all, or nearly all, of the western connections of the trunk lines desired to have the rates reduced.

The facts in the case are that the Chicago Committee, consisting of representatives of all the co-operating roads that carry from Chicago to the East, unanimously recommended that rates be not reduced, and that the Central Association unanimously adopted the report of the Chicago Committee, and so reported to the trunk lines, which have simply (but also unanimously) adopted the recommendation of the Western roads. Whatever the wisdom of the course, therefore, it is the one deliberately chosen by the roads which carry the traffic, in the West as well as the East.

Probably the roads west of Chicago would prefer to have the rate low. It never can be too low for them, because few of them, and these only to a slight extent, have to carry the traffic at trunk-line rates, and the lower the cost of transportation east of them the better for them, just as it would be better for the trunk lines if it cost nothing to carry across the Atlantic to Europe the freight which they bring to the seaboard. But while this may be so, it is not to be supposed that the railroads west of Chicago object to those east of it getting a profit on the business which they carry any more than the trunk lines object to the steamers making a profit on their traffic.

March Accidents.

Our record of train accidents in March, given in full on another page, contains brief accounts of 22 collisions, 55 derailments and 4 other accidents; a total of 81 accidents, in which 49 persons were killed and 131 injured.

Two collisions, 15 derailments and 1 other accidents caused the death of one or more persons each; 8 collisions and 13 derailments caused injury to persons, but not death. In all, 18 accidents caused death and 21 injuries, leaving 42, or 52 per cent. of the whole number, in which there was no injury serious enough for record.

The 22 collisions killed 3 persons and injured 15. In the 55 derailments 45 persons were killed and 116 injured; while in the 4 other accidents 1 person was killed.

Of the killed 42 and of the injured 52 were railroad employés, who thus furnished 86 per cent. of the killed, 40 per cent. of the injured and 52 per cent. of the whole number of casualties.

As compared with March, 1885, there was a decrease of 5 accidents, but an increase of 32 in the number killed and of 47 in injured.

These accidents may be classed as to their nature and causes as follows:

COLLISIONS:		16
Rear		5
Butting		1
Crossing		1
—	22	
DERAILMENTS:		
Broken rail	6	
Broken rail joint	1	
Broken switch-rod	1	
Broken bridge	3	
Spreading of rails	6	
Broken wheel	1	
Broken axle	7	
Broken brake-beam	1	
Accidental obstruction	1	
Cattle on track	2	
Wash-out	1	
Land-slide	1	
Snow or ice	1	
Misplaced switch	2	
Purposely misplaced switch	1	
Rail removed purposely	3	
Malicious obstruction	2	
Unexplained	9	
—	55	
OTHER ACCIDENTS:		
Broken parallel-rod	2	
Overhead bridge	1	
Broken axle not causing derailment	1	
—	4	
Total number of accidents	81	

Of the collisions 3 were caused by trains breaking in two; 2 by misplaced switches, and 1 each by fog and by cars blown out upon the siding by high winds.

One of the broken bridges recorded failed on account of the weakening of its abutments by a freshet. The other two were wooden trestle bridges.

A general classification of these accidents is made as follows:

	Collisions.	Derailments.	Other.	Total.
Defects of road	17	4	17	17
Defects of equipment	3	9	4	16
Negligence in operating	17	2	16	19
Unforeseen obstructions	2	12	14	14
Maliciously caused	6	6	6	6
Unexplained	9	1	1	1
Total	22	55	4	81

Negligence in operating is thus charged with 23 per cent. of all the accidents, defects of road with 21, and defects of equipment with 20½ per cent.

A division according to classes of trains and accidents is as follows:

Accidents:	Collisions.	Derailments.	Other.	Total.
To passenger trains	1	20	3	24
To a pass. and a freight	5			5
To freight trains	16	35	1	52
Total	22	55	4	81

This shows accidents to a total of 103 trains, of which 30 (29 per cent.) were passenger trains, and 73 (71 per cent.) were freight trains.

Of the total number of accidents 51 are recorded as happening in daylight and 30 at night.

Perhaps the most notable feature of the month was the small number of collisions reported, considerably less than one-third of the whole number, or much below the usual proportion.

Wash-outs and land-slides form a prominent feature of the record, showing that the month was not by any means free from elemental disturbances.

No less than six accidents were maliciously caused. All of them were on the Southwestern system, which has been disturbed by strikes, and all were evidently meant to stop or interrupt traffic.

The most fatal accident of the month was on the Columbus & Western road in Alabama, where an entire construction train went down into a swollen river, carrying with it 19 laborers, all of whom were drowned.

For the year ending with March the record is as follows:

Accidents.	Killed.	Injured.									
April	81	14	75								
May	62	8	66								
June	75	24	115								
July	76	28	75								
August	92	37	172								
September	91	25	98								
October	123	36	134								
November	96	19	118								
December	74	31	153								
January	94	40	90								
February	98	21	157								
March	81	49	131								
Total	1,043	372	1,383								
Total, same months, 1884-85	1,266	370	1,783								
" " 1883-84	1,518	448	1,893								
" " 1882-83	1,534	416	1,742								

The yearly average for the four years was 1,340 accidents, 392 killed and 1,700 hurt. The monthly average for last year was 87 accidents, 28 killed and 115 injured.

The averages per day for the month were, 2.61 accidents, 1.58 killed and 4.23 hurt; for the year they were, 2.86 accidents, 0.91 killed and 3.79 injured.

The average casualties per accident were, for the month, 0.605 killed and 1.617 injured; for the year, 0.318 killed and 1.326 injured.

March was thus below the average of the year in accidents, but above it in the number of killed and injured.

The Winter Packing Season.

The number of hogs packed in the West and their weight during the "seasn" of four months, from Nov. 1 to Feb. 28, inclusive, has been as follows:

Year.	No. hogs.	lbs.	Year.	No. hogs.	lbs.	Year.	No. hogs.	lbs.
1871-72	4,831,558	1,374,7	1879-80	6,950,451	1,850,1	1877-78	6,781,064	1,768,000
1872-73	5,410,314	1,571,0	1880-81	6,919,456	1,796,6	1878-79	6,781,064	1,768,000
1873-74	5,466,200	1,468,9	1881-82	5,747,760	1,509,8	1879-80	6,781,064	1,768,000
1874-75	5,566,226	1,459,5	1882-83	6,132,212	1,637,4	1880-81	6,781,064	1,768,000
1875-76	4,880,135	1,328,1	1883-84	5,402,064	1,358,3	1881-82	6,781,064	1,768,000
1876-77	5,101,363	1,376,8	1884-85	6,460,240	1,721,7	1882-83	6,781,064	1,768,000
1877-78	6,505,446	1,838,1	1885-86	6,298,995	1,631,3	1883-84	6,781,064	1,768,000
1878-79	7,480,648	2,030,4						

Thus the weight of hogs packed, which increased immensely and all at once after 1876-77, after having been nearly stationary for six years, fell off 16 per cent. from 1881 to 1882, and has not since recovered to the amounts of the four years from 1878 to 1881, but was this year 5 per cent. less than last, 12 per cent. less than in 1878 and 1880, and 19½ per cent. less than in 1878-79.

The packing has been greatly affected by the corn crops, which have been, in millions of bushels:

Year.	No. hogs.	lbs.	Year.	No. hogs.	lbs.
1871	1,092,7	932,8	1850-51	1,320,1	1,283,8
1872	1,092,7	932,8	1850-51	1,320,1	1,283,8
1873	1,092,7	932,8	1850-51	1,320,1	1,283,8
1874	1,092,7	932,8	1850-51	1,320,1	1,283,8
1875	1,092,7	932,8	1850-51	1,320,1	1,283,8
1876	1,092,7	932,8	1850-51	1,320,1	1,283,8
1877	1,092,7	932,8	1850-51	1,320,1	1,283,8
1878	1,092,7	932,8	1850-51	1,320,1	1,283,8
1879	1,092,7	932,8	1850-51	1,320,1	1,283,8
1880	1,092,7	932,8	1850-51	1,320,1	1,283,8
1881	1,092,7	932,8	1850-51	1,320,1	1,283,8
1882	1,092,7	932,8	1850-51	1,320,1	1,283,8
1883	1,092,7	932,8	1850-51	1,320,1	1,283,8
1884	1,092,7	932,8	1850-51	1,320,1	1,283,8
1885	1,092,7	932,8	1850-51	1,320,1	1,283,8
1886	1,092,7	932,8	1850-51	1,320,1	1,283,8
1887	1,092,7	932,8	1850-51	1,320,1	1,283,8
1888	1,092,7	932,8	1850-51	1,320,1	1,283,8
1889	1,092,7	932,8	1850-51	1,320,1	1,283,8
1890	1,092,7	932,8	1850-51	1,320,1	1,283,8
1891	1,092,7	932,8	1850-51	1,320,1	1,283,8
1892	1,092,7	932,8	1850-51	1,320,1	1,283,8
1893	1,092,7	932,8	1850-51	1,320,1	1,283,8
1894	1,092,7	932,8	1850-51	1,320,1	1,283,8
1895	1,092,7	932,8	1850-51	1,320,1	1,283,8
1896	1,092,7	932,8			

railroad were reduced, and now for the most part are but 50 or 60 per cent. of the rates permitted by law.

These reductions, it is said, were of no benefit to the grain-grower, the grain buyers in the country and the traders and exporters at Odessa absorbing the whole. The farmers got advances from grain brokers, and were pretty much at their mercy; and it was complained that these brokers when they got the grain did not take pains to keep it in good condition, so that Russian wheat was losing its good reputation. Here the Southwestern Company stepped in (apparently like some of the railroad elevator companies in Minnesota and Dakota) and set up in the grain brokerage business itself, in connection with a great grain exporting firm in Odessa, charging 8 per cent. interest for advances to the farmers. This business was begun Sept. 1, 1883, and almost immediately had all its capital engaged, though neither advances nor purchases seem to have been on a large scale, as during the year 1884 only 501,684 bushels were bought, and in 16 months only \$212,000 advanced. Naturally, the old grain brokers were disgusted at this new and powerful competition, and they are said to have reduced their charges materially.

The railroad has an official at the Odessa elevators, who acts as the broker of those who have sent their grain there on their own account, selling when they order, the railroad only then collecting freight and elevator charges, and making advances until sold up to 75 per cent. of its value. This agent gets 1 per cent. on the sales as commission. The advantage to the producers and other country shippers over former methods is said to be great. The railroad undertook this work because the grain business, its chief traffic, seemed threatened with destruction, but it would seem to give it a dangerous power.

The Strength of Spikes.

A correspondent points out to us that, in the remarkable illustration of "the Strength of Spikes," afforded at two wash-outs on the Boston & Providence Railroad, described in our issue of April 2, the weight of the track per yard was multiplied by the span in feet, instead of in yards, to determine the total load. Correcting this error we find that the total tensile strain, resisted (presumably) by the shearing strength of the spikes, was for the

60 ft. span, illustrated 20,000 lbs.
150 ft. span, not illustrated 50,000 "

To resist this strain there was the shearing strength of two spikes at most, of about 0.32 square inch section, while it was exceedingly probable at some one end of some one joint, some one of the 160 spikes whose efficiency was tested in these two wash-outs, would have such an inefficient bearing as to be practically out of the game, leaving only one spike to do the work. At the large maximum of 30,000 lbs. per square inch shearing strength, each spike would resist 19,000 lbs. only, so that in the larger span, at least, every spike must have done full work.

The same correspondent who discovered this error then proceeds to make a recomputation containing several new errors of his own. One of these is an assertion that the tension at any point in a suspension bridge is the same; another is in omitting the live load on the span; another is in changing the correct section of $\frac{1}{2}$ in. spike to 0.3127 square inch; but the only one which seems to call for comment is an assumption that the spikes were in double shear, which is done on the following grounds:

S U S

The top lines represent the base of the rails, and the second line the Fisher base-plate resting on two ties. It is then assumed that the tie acts like an under plate, so that the base-plate cannot pull out from between rail and tie without shearing off the spike twice, the obvious answer to which is that, although this is true of shear in one direction, there is nothing to prevent the rail above from pulling off from the base-plate with but a single shear. To have true double shear it would be necessary to have a continuous under tension member from joint to joint, similar to the base of the rail above.

It seems worth while to determine the true meaning of this very remarkable incident, as to which we agree with our correspondent that, "be the unit stress what it may, the existence of the 150-ft. span is a remarkable testimonial to both the Fisher 'bridge joint' and to the track department of the Boston & Providence Railroad." Therefore, we may again note that it is practically impossible that the deflection can have much exceeded $\frac{1}{4}$ of the span, if any, for the reason that even that deflection requires a separation at the joints of about $\frac{1}{4}$ in., which is the utmost that can be assumed without shearing of spike, which, had it begun, would very certainly have continued. Throwing out the untenable suppositions, therefore, we have:

Tensile strain, 20,000 lbs. and 50,000 lbs., respectively.
Resistance of spike, 18,000 lbs. (1 spike), or 38,000 lbs. (2 spikes).

Leaving a considerable deficit of stability in one case at least.

This deficit can be reasonably accounted for in only one way. The 1 in. U-bolt clamps the two rails together with a force which must be 15,000 lbs. before the spring underneath is compressed, and may be any amount more, up to the ultimate strength of the U-bolt, which may be some 60,000 or 70,000 lbs. in all. The rail is then confined between the base plate and "fore-locks," which are only a few inches long, and the weight of the track would bring a tremendous leverage to bear on them, increasing the strains on the U-bolt up to nearly its ultimate strength. In that case, the sharp angles would be apt to imbed themselves slightly into the

metal, but even without doing so a co-efficient of friction as high as one-third, or even higher, has been not unfrequently observed under such circumstances, which would reinforce the resistance of the spikes with an additional resistance of possibly 20,000 or even 25,000 lbs. That this was the true cause for the maintenance of stability in one case, if not in both, we have little doubt.

Balanced Valves and Coal Consumption.

A record in the *American Engineer* of the performance of the locomotive "W. T. Reaser, No. 1," fitted with the Reaser balanced slide-valve, as furnished by Mr. C. E. Smart, General Master Mechanic of the Michigan Central Railroad, presents some interesting features, which we cannot say with that journal "need no comment."

The comparison appears to be with two regular Michigan Central passenger engines, presumably of the same weight and dimensions as the "Reaser" and hauling the same load, and is embodied in the following brief table:

Memorandum of Locomotive Performance, December, 1885. Reaser Engine No. 1 and Michigan Central Railroad Engines 251 and 256.

Engine.	Miles.	Pts. oil.	Tons coal.	Ton oil.	Miles run to
Reaser.	3,214	291	118	27.2	12.3
251	3,741	327	182	20.5	11.4
256	3,126	258	157	19.8	12.1

That a balanced slide-valve should have such a remarkable effect as to increase the efficiency of a ton of coal by over one-third must certainly be regarded as extraordinary; and without prejudice to the great utility and advantage of approved devices of that kind, which now is practically beyond dispute, few would be disposed to claim, and no experienced railroad man would admit, that balancing of the slide-valve only could have so great effect in regular working, or anywhere nearly so great effect.

We are therefore driven to find some other explanation for a large part of the difference, and while we cannot do this directly from the data given, we can determine how a considerable part of the apparent discrepancy may have arisen, and in doing so find some interesting evidence as to another matter—the effect on fuel consumption of difference in length of train.

In connection with and as a basis for the above summary of the tests, is given a detailed table of the coal consumption on 25 days (excluding four days on which a freight train was hauled one way), on each of which a round trip of 115 miles was made. The number of cars was different on almost every day, ranging from 5 to 12; so different, in fact, that only on five days was the number of cars hauled the same in each direction. Averaging the number of cars out and back, which gives us a great many half-car trains, adding together and averaging the coal consumption on the days when the average train out and back was the same, and reducing it to the coal consumption per train-mile, we obtain the following comparison:

Comparative Coal Consumption with Light and Heavy Passenger Trains—Michigan Central Railroad. (Same Engine.)

LIGHT TRAINS.			
No. of round trips.	Av. No. cars handled.	Coal consumption per mile.	
3	5	58.	62.3
3	5 $\frac{1}{2}$	55.5	61.
2	6	62.1	61.4
1	6 $\frac{1}{2}$	....	48.4
9 Averages..	5.56	58.5	60.0

* This was the first trip of the series, Nov. 16, and possibly a warm day.

HEAVY TRAINS.			
2*	7 $\frac{1}{2}$	74.6	79.3
1	8	....	78.6
7	8 $\frac{1}{2}$	71.8	79.4
2	9	81.6	85.4
3	9 $\frac{1}{2}$	73.6	77.3
1	11 $\frac{1}{2}$	....	75.0*
16 Averages.8.78	75.4	84.4	79.3

* This trip also was on one of the earlier days, and possibly warm.

NOTE.—The averages of maximum and minimum are mere arithmetical averages of the figures given. In the last column the total coal consumption was divided by the total mileage to get the average.

All these trains made frequent stops; 30 in 115 miles, or about one every four miles. Speed not given; probably over 30 miles per hour maximum between stations.

Pausing for a moment to consider what a beautiful economy in coal consumption such a difference as that of 2 to 4 above would show in favor of a road or a country where trains were usually light, against a road or a country where trains were usually heavy, if the weight of trains were not properly considered, the apparent indications of this table are that an increase of train load of 3.22 cars, from 5.56 to 8.78 cars increases coal consumption from 60.0 to 79.3 lbs. per train mile, or 19.3 lbs. from which, by an easy sum in division, we deduce that each car appears to increase the coal consumption by $\frac{19.3}{3.22} = 6.0$ lbs. per car. From this it is but a step to the further conclusion that with the short trains there was:

Coal consumption due to cars, 5.56 × 6.0 lbs. =	Lbs. per mile.
Which, subtracted from 60.0, leaves as due to engine, independent of number of cars.....	33.36
	26.72
With the long trains we have, similarly:	60.00

Coal consumption due to cars, 8.78 × 6.0 lbs. = 52.08
Which, subtracted from 79.3, leaves as due to engine..... 26.02

79.30

This result is not so very far off from what direct experience has shown to be the consumption of heavy passenger engines running light. Mr. Reuben Wells, some years ago, made a test of a light passenger engine, 14 by 22 cylinders,

running 108 miles with six stops at 22 miles per hour, and losing about one-sixth of its time only in stops, with a consumption of only $18\frac{1}{2}$ lbs. per mile, and this test was in warm weather. Allowing for the differences of weather, size and number of stops, the correspondence is close, and other tests, to which we need not refer in detail, have shown from 20 to 30 lbs. The most extraordinary record of the kind is one recently advanced by Mr. William Stroudley, Mechanical Superintendent of the London, Brighton & South Coast Railway, where it is stated that a heavy passenger engine was run light between London and Dover with a consumption of only 7 lbs. per mile. As the distance is only a little over 50 miles, however, and the quantity stated would amount to only a few inches over the bottom of the fire-box of 20 square feet, or barely as much as the same record shows was habitually used to get up steam, there is considerable room for possible error in this estimate. But there is a further contingency which may have affected the above comparison materially, difference in temperature of the air. The tests extended from Nov. 16 to Dec. 26, during which the weather, of course, was continually growing colder, although probably with considerable fluctuations each way. The average date of the light train tests may be determined from the record to be Dec. 6, and of the heavy train tests, Dec. 15. The chances are that the average of the latter would show considerably colder weather, whatever may have been the case on those particular dates. This should make the heavy trains show somewhat larger consumption; this decreases the apparent effect of adding more cars; and this increases the apparent consumption chargeable to the locomotive alone, regardless of length of train. It hardly seems probable, however, that the effect of temperature can have been great, and despite the difference of average date there may have been no corresponding difference of average temperature, or even the difference may have been the reverse of what probability indicates. As records of this character, showing the effect on coal consumption of differences of load, are not readily obtainable, we shall endeavor to obtain the weather records and see what allowance, if any, should be made for their effect.

The meeting of the Committee on Continuous Brakes for Freight Trains of the Master Car-Builders' Association, which was to have been held this week (on Wednesday, April 21) at the Bolton House in Harrisburg, Pa., has been postponed for one week, until Wednesday, April 28, at the same place. At this meeting it is expected that final arrangements will be made for the competitive tests.

In the editorial article on the West Deerfield Accident, in our number of last week, reference was made to an accident taking place Aug. 11, 1880, at May's Landing. A blunder of the types made it appear that this accident took place on the Philadelphia & Atlantic City road, instead of the West Jersey & Atlantic, to which road it should be referred.

March earnings are reported by ten additional railroads this week, seven of which report increases over last year, which, however, are nearly balanced by the decreases of the other three. The roads reporting are all small and the ten together earned but half as much as the Northwestern or the Milwaukee & St. Paul alone. The gains of 27 $\frac{1}{4}$ per cent. by the Marquette, Houghton & Ontonagon, 20 by the Indianapolis, Decatur & Springfield, and 40 by the Texas & St. Louis seem important, but they are less so than they seem; for their earnings per mile were but \$185, \$203, and \$172 respectively—that is, among the smallest reported, and the percentage of gain is large because they were doing excessively ill last year. The roads that have reported so long have had the following March earnings for the last five years:

1882.	1883.	1884.	1885.	1886.	
Ala. Gt. So.	\$68,885	\$80,615	\$98,157	\$97,203	
Ind., Bloom. & W.	204,432	248,801	193,222	227,089	203,877
Mard. H. & Ont.	24,054	20,590	24,092	23,342	20,900
N. Am., Chat. & St. L.	177,336	206,164	206,819	186,737	187,349
N. O. & N. E.	31,921	31,921	68,440	56,030	40,891
Vicks. & Meridian.	36,173	43,803	38,921	36,900	32,888
Vicks., Shreve. & P.	4,156	9,019	32,415	32,415	32,888
Wisconsin Cen.	92,039	135,701	138,156	137,938	130,999

*Including Indianapolis, Decatur & Springfield.

Of these the Alabama Great Southern, the Marquette, Houghton & Ontonagon and the Vicksburg, Shreveport & Pacific earned more this year than ever before; but the Marquette road has a large increase in mileage (160 against 88 in 1882), and the Vicksburg & Shreveport has been open through but two years. The Wisconsin Central earned less this year than in any other since 1882.

The 63 railroads that have reported for March, so far, had in the aggregate:

1886.	1885.	Increase.	P. c.
Earnings....	\$18,058,059	\$17,877,723	\$184,336 1.0

That is, there is very little change from last year, when 83 roads had an increase of 1.6 per cent. in total earnings, but a decrease of 1.2 per cent. in earnings per mile compared with 1884, when 78 roads earned 3.7 per cent. less in the aggregate and 10.8 per cent. less per mile than in 1883. Doing no better than in 1885 and 1884 is not doing well, but some of the great railroads that have not yet reported will probably make a better showing.

The total production of anthracite coal last year was 31,623,529 tons, an increase of 905,236 tons, or 2.9 per cent., over 1884, but a decrease of 169,498 tons, or 0.9 per cent., from 1883. The output for 1885 was greater than that for any previous year, with the single exception of 1883, and was only a trifle below the great tonnage of that year. The official statement from which these figures are taken gives the entire production, with the exception of the coal used for steam and heating purposes at the mines and

by the employees of the coal companies, and thus includes all the coal which is carried away from the mines and enters into transportation.

The distribution of the coal is shown by the following table, which gives the percentage of the total tonnage consumed in or shipped to the districts named for four years past:

	1885.	1884.	1883.	1882.
Pennsylvania, New York and New Jersey	68.8	67.3	68.6	68.5
New England states	16.4	16.6	16.9	17.4
Western states	0.8	0.9	0.0	7.6
Southern states (inc. Delaware and Maryland)	4.3	4.4	4.0	0.2
Pacific coast	2.8	2.7	2.3	2.1
Canada	0.1	0.1	0.1	0.2
Foreign ports				
Total	100.0	100.0	100.0	100.0

This table shows that the changes in the distribution of this kind of coal have been surprisingly small. As compared with 1884 there is no change in 1885 as great as 1 per cent.

Last year almost exactly two-thirds of the production was consumed in the Middle states and one-sixth in New England, where hard coal is chiefly used, not only for domestic purposes, but also for steam production and manufacturing purposes, though bituminous coal has gained a footing as a steam coal to some extent in New England and Eastern New York and largely in Western New York, as is indicated by the efforts of the New York Central, the Erie, the Rochester & Pittsburgh and the Buffalo, New York & Philadelphia to control sources of supply in Western Pennsylvania for distribution northward and eastward. This, however, we see has not reduced the consumption of anthracite in New York and New England, though it may have prevented an increase that otherwise would have occurred.

The proportion of anthracite going southward remains small, and the greater part of the shipments in that direction are to the three cities of Wilmington, Baltimore and Washington, very little going south of the Potomac, except to the seaboard cities.

The greatest increase, in fact the most important increase, was in the Western trade, which grows steadily, although somewhat slowly. Here the conditions are almost exactly reversed from those of the New England and Middle states, and the local bituminous coals must remain the chief fuel, especially for manufacturing, the costs of transportation making anthracite an expensive fuel outside of the lake ports and necessarily confining its use, even as a household fuel, to those who are able to consider convenience rather than cost. The same considerations will also limit the consumption in Canada, where the use of anthracite is chiefly confined to the lake ports, and where its use is also further limited by the imposition of a customs duty. The shipments to the Pacific Coast and to foreign ports increase very slightly and their total amount is insignificant, being less than half a day's average production of the mines.

Upon the whole, the anthracite coal trade last year was fairly satisfactory, as far as quantity is concerned, but that advantage was obtained chiefly by a decline in prices, which has seriously reduced the profits of the coal companies and the coal carriers. These are in most cases identical, and a reduction in price means not only smaller returns to the miner, but a decrease in the tolls allowed to the carrier for taking it to market.

Chicago through rail shipments eastward of flour, grain and provisions, by the incomplete report, not including the Chicago & Atlantic Railway, for the week ending April 17, have been, in tons:

1882.	1883.	1884.	1885.	1886.
21,969	28,474	74,807	68,192	18,644

The Chicago & Atlantic was not open until 1884. The shipments by it were 8,100 tons that year and 2,327 tons this year. The total shipments this year were probably nearly the same as in 1882, but the decrease from last year (58 per cent.) and 1884 (72 per cent.) is very great, as in previous weeks.

By the complete report, including all classes of freight, the shipments had been down to 1884.

1880.	1881.	1882.	1883.
34,560	73,362	32,232	35,728

The total shipments of the last week probably amounted to not less than 31,000 nor more than 35,000 tons, and were among the lightest ever made with lake navigation closed; but in 1882 there were 16 weeks of total shipments less than 30,000 tons, and in 1883 nine weeks of such shipments.

The shipments by the different railroads are not reported. The percentages are likely to be very deceptive when the grain shipments are so small and the shipments of higher class freights are not included, but the people engaged in the traffic ought not to be deceived by them, and the figures have a certain value, if not a very great one.

For seven successive weeks the total reported Chicago shipments have been:

	Week ending				
	Mar. 27.	Mar. 28.	Mar. 29.	Mar. 30.	Apr. 1.
Flour	5,684	4,985	5,650	5,221	5,083
Grain	34,023	19,686	14,757	16,502	11,490
Provisions	7,225	7,262	6,173	5,800	6,131
Total	45,214	32,637	25,915	27,952	22,910

For eight successive weeks the reported shipments of flour, grain and provisions (not including those by the Chicago & Atlantic) have been, in tons:

	Week ending				
	Feb. 27.	Mar. 6.	Mar. 13.	Mar. 20.	Mar. 27.
Flour	3,966	5,684	4,985	5,650	5,221
Grain	34,023	19,686	14,757	16,502	11,490
Provisions	7,225	7,262	6,173	5,800	6,131
Total	45,214	32,637	25,915	27,952	22,910

The decrease since the first week of March has thus been 57 per cent.

At a meeting of the Central Association last week it was decided not to reduce the rate of 25 cents on grain and flour, notwithstanding the expectation that the lakes might be open on almost any day. The rates on grain by lake have been

rising ever since February, and the later engagements were at 4½ cents per bushel from Chicago to Buffalo, while on the canal 5½ cents is asked to New York. This, with the transfer charge, makes about 11 cents per bushel from Chicago to New York. Probably if the rail rates were reduced from 25 to 20 cents (15 to 12 cents per bushel), the water rate would be reduced fully three cents within a week, and the railroads would not carry a bushel more by reason of their reduction; and at either rate they are not likely to carry much *through* to New York from Chicago, Milwaukee or Duluth, but at either rate they may carry most of the supplies for interior points, and especially from the part of the country which is at some distance south or southwest of the lakes. The interior supplies of the country east of Buffalo and Erie, however, may arrive chiefly by lake and rail, as they always do largely, even when the all-rail rates is below cost.

The lake and canal rates at this time are 4 cents a bushel for corn and 4½ for wheat from Chicago to Buffalo by lake, and 5½ for corn and 5½ for wheat from Buffalo to New York. These may be compared with the opening rates in previous years, though it must be remembered that the rates just quoted may not be the *opening* rates this year, which may be either higher or lower, but probably very little different. The opening rates for six years previous to this year have been:

Lakes:	1880.	1881.	1882.	1883.	1884.	1885.
Wheat	6	5	2½	3½	2½	3½
Corn	5	4½	2½	3½	2½	3
Ca - al:						
wheat	7½	6½	5½	6	4½	5
Corn	7	6	5	5½	3½	4½

Thus the present rate through (exclusive of Buffalo transfer) is 10½ cents per bushel for wheat, against an opening rate, 8½, last year, and 7 in 1884. The difference between the higher of these rates and this year's rate is equal to a difference of 3½ cents per 100 lbs. in the rail rate, and the difference between the 1884 and 1886 water rates is equal to a difference of 5½ cents in the rail rate. The water rates are very largely dependent on the rail rates, and a reduction in the latter would doubtless bring down the former immediately. It is not certain by any means, however, that the maintenance of the present rail rates will keep up the water rates. On the contrary, they usually fall after the opening, but they fell last year, and especially the year before, when rail rates were 15 cents for a long time before as well as after the opening of navigation, as well as in those years when the rail rates were reduced as soon as navigation opened. The maintenance of water rates is likely to depend chiefly this year on the amount of grain to go east. There is grain enough to keep the vessels busy, but so far it has been indisposed to move. If this indisposition continues, the vessels by their competition with each other will bring down their rates. In any event, they are likely to carry most of the grain going from lake ports to the East, and it is to be hoped that they will make something out of it, as the railroads for two years past have spoiled their business at the same time with their own.

The new rates on live stock and dressed beef, which it was claimed would destroy the dressed beef business, seem rather to be deadly to the live stock business, if we may trust the insufficient data afforded by the New York receipts in March. The live stock receipts in that month were 20½ per cent. less this year than last, while the dressed beef receipts were 25 per cent. more. The dressed beef receipts in March last were almost exactly the same as the average monthly receipts in 1885, and 62 per cent. more than the average monthly receipts in 1884. But New York city receives so little dressed beef that it is not safe to infer that the business elsewhere has fared as it has there. In 1885 it received nearly 12 tons of live stock for every ton of dressed beef. In March, however, it took only 8½ tons of live stock to one of dressed beef; in February, nine to one; in January, 10½ to one.

The shipments from St. Louis and East St. Louis did not suffer so much from the strike in March as one might have expected, as they amounted to 18,927 tons then, against 20,340 in February and 21,653 in January, and at Chicago the rate of decrease from February to March was greater than this. The strike, however, did not affect the shipments directly until the last week or ten days of the month, when it began in the East St. Louis yards.

The effect of the strike on the receipts of grain at St. Louis may be traced to some extent by the weekly receipts there and the proportion they bear to the aggregate receipts of the eight reporting Northwestern markets. These have been as follows:

Week to—	St. Louis.	N. W. markets.	Total.	St. Louis.
Feb. 27.	1,019,573	3,797,062	4,816,635	21.1
March 6.	1,584,580	3,742,081	5,326,661	29.8
" 13.	820,512	3,577,553	4,407,065	18.7
" 20.	618,751	3,713,097	4,331,848	14.2
" 27.	306,547	2,761,831	3,068,378	10.0
April 3.	346,449	2,311,932	2,678,381	12.9
" 10.	662,563	2,308,607	3,061,170	21.3

The strike began with the second week of March. The season is one of naturally decreasing receipts, because farmers have been able to work in the fields since the strike began, in most of the territory which ships grain to St. Louis; and this is shown by the receipts at the other seven markets for the last three weeks, which have averaged nearly a third less than in the first four weeks. In the week to April 10 St. Louis received something like its ordinary proportion of the total Northwestern receipts, after having much less for three weeks. The delays to traffic at East St. Louis are likely to have had more effect on St. Louis receipts than any disability

of the Missouri Pacific Railroad; for the latter is able to forward its grain by way of bridge over the Mississippi, north of St. Louis, if necessary.

The largest earnings per mile reported for any railroad in the United States (excepting the New York elevated roads) are on the New York Division of the Pennsylvania Railroad. This division, including the main line from New York to Philadelphia and 16.2 miles of branches, 105.96 miles in all, earned in 1885 at the rate of \$101,926 gross and \$31,926 net per mile. The gross earnings of the Pennsylvania main line from Philadelphia to Pittsburgh, 358 miles, were \$59,625 per mile last year, while the Pennsylvania Railroad proper (not including leased branches), 421.56 miles in all, earned \$50,635 gross and \$19,208 net per mile.

The leasing of the Virginia Midland Railroad to the Richmond & Danville Company, which is noticed elsewhere, is understood to be the beginning of a movement for the consolidation of the system of roads controlled by the last-named company. Besides the line from Richmond to Atlanta, with its branches, which the Richmond & Danville has heretofore operated directly, it has controlled the Charlotte, Columbia & Augusta, the Columbia & Greenville, the Western North Carolina, the Virginia Midland, the Georgia Pacific and several minor lines, but these companies have retained their own organization and have been controlled through the ownership of a majority of their stock by the Richmond & West Point Terminal Co., an organization the majority of whose stock is owned by the Richmond & Danville. At the last annual meeting, resolutions favoring a closer union and a single management were passed by the stockholders, and the lease of the Virginia Midland is the first step towards carrying this plan into execution. It will be followed, as soon as the legal formalities can be completed, by the lease of the other controlled lines, so that the entire system may, by the close of the present year, be brought under a single central management, doubtless with much advantage as far as economy is concerned, and the probability is that the intermediary terminal company will be entirely dispensed with. The lines in this company's system have usually been kept in good condition, but a considerable expenditure will be needed this year, principally for the change of gauge which is to be made on all of the lines next month.

A track which the entire traveling public would agree to look on as good would be something of a curiosity. There is a feeling among railroad men that, whatever other faults the Pennsylvania Railroad may have, it has, comparatively speaking, fairly good track, quite up to the general average; but Mr. Charles Dudley Warner, in an account of "The Way to Mexico," published last week, gives this track the following first-class notice:

"Oddly enough, the very roughest riding experienced on the whole route (which was from New York *via* Pittsburgh, Cincinnati, Mobile, New Orleans and El Paso to the City of Mexico), was in the night from New York to Pittsburgh; the passengers got a terrible shaking up, and nearly everybody was sea-sick. The road from Pittsburgh to Cincinnati was not much better. After leaving the latter city, we had no reason to complain of the condition of the track all the way to the city of Mexico."

It can hardly be expected that one who has given so much attention to "Back-Log Studies" as Mr. Warner should likewise have studied up on track, even enough to know a good track when he sees it. Nevertheless, after making all allowances, one cannot but suspect that the contents of the "ample lunch basket" which Mr. Warner recommends every one to take, in the same article, might have had more to do with his "sea-sickness" than the track. He should have saved his criticism for the "Editor's Drawer" of *Harper's Magazine*.

But when he touches the question of eating-houses, Mr. Warner speaks more by the card, and his words are of general application to the restaurants on many thousands of miles, they will bear repetition:

"After the tourist leaves Philadelphia he will travel thousands of miles before he sees a decent railway restaurant. Perhaps the worst is not in the Cincinnati station, but if a premium was awarded for a bad restaurant, that would rub any other hard and leave Pittsburgh out of sight. Indeed, until one reaches Mexico, the tourist will not find one good meal decently served. And in Mexico, on the Central Railway, he will not if the restaurant is kept by an American. The worst fare was had in Texas."

"This state of things will continue so long as American travelers do not complain. But there is no excuse for it. The railway people can make it otherwise if they care to do so. They at least know what decent fare is, even if the majority of local travelers in the West and Southwest do not. They know that the passengers on their trains are served like pigs. All the eating-places are dirty, all the food is barbarously cooked, and it is served—well, much as it would be served in a trough!"

The probable effect of such "reading notices" as this—whose sting lies in their truth—on tourist travel hardly needs discussion.

The great Cunard Steamship Company has a property which figures in its balance sheet as costing \$15,100,000, \$13,900,000 of which represents vessels and their equipment. Its capital stock issued is £1,600,000, worth at the present London prices £640,000, and there are £450,000 of debentures outstanding. Together they appear to be worth less than 40 per cent. of what the vessels have cost. It earned gross last year £1,100,500, of which only £193,701 were profit, the expenses absorbing nearly five-sixths of the receipts. All of this profit, except the £26,845 required for interest on the debentures and floating debt, was charged to "depreciation" and "insurance" funds, which the loss of the "Oregon" will make convenient. Thus, on the \$15,000,000 of capital in the company only \$134,000 (0.9 per cent.) of interest was

paid last year, which leads to the conclusion that other carriers than railroads have been having a hard time lately.

The exports of rails from Great Britain to the United States in March last, for the second month since 1883, were iron rails—11 tons, the last reported before being 7 tons, in September, 1884. In nine of the months in 1883, iron rails were exported to this country, but the aggregate for the year was only 2,035 tons, against 21,135 tons in 1882, 96,139 in 1881, 106,061 in 1880, and 20,820 in 1879. The exports of steel and iron rails to the United States in March and the three months then ending, have been:

	1880.	1881.	1882.	1883.	1884.	1885.	1886.
March.	14,528	25,720	22,265	4,691	1,523	25	836
Three mos.	42,589	47,890	72,710	14,830	6,857	211	1,836

Thus, while the exports this year for the three months were 770 per cent. more than last year, they were after all only enough for 20% miles of track of 56-lb. rails, and so quite insignificant. Evidently the orders for the Chicago, Burlington & Quincy and the Michigan Central had not been shipped before April.

The total British exports for the three months have been for four years, in tons of 2,240 lbs.:

1883.	1884.	1885.	1886.
192,699	122,843	110,260	82,136

Exclusive of the exports to this country they have been:

1883.	1884.	1885.	1886.
177,819	115,986	110,049	80,300

The exports to countries other than the United States this year are 27 per cent. less than last year, 31 per cent. less than in 1884 and 55 per cent. less than in 1883, when they were near their maximum. The total this year would provide for only 912 miles of 56-lb. track, which would not go far toward the maintenance of the countries which England still supplies. More than a third of the total exports this year were to India, and more than a fifth to Australia, which are still building some new railroads. Mexico has taken 314 tons. Nearly a fifth of the total exports went to Brazil and the Argentine Republic, which alone in America have taken any appreciable amount, and they only enough for 182 miles of track. Evidently the world that gets rails from England is not building much railroad just now, and Europe certainly is not.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines is given in the current number of the *Railroad Gazette* as follows:

Chicago, Burlington & Northern.—There have been laid at different points 19 miles of track more than has been heretofore reported.

Fort Worth & New Orleans.—Extended from Mountain Creek, Tex., southeast 21 miles.

St. Louis, Kansas City & Colorado.—Track laid from Forstye Junction, Mo., north by west 14 miles.

San Antonio & Aransas Pass.—Extended from Beauregard, Tex., southeast 10 miles.

This is a total of 64 miles on 4 lines, making in all 509 miles thus far reported for the current year. The new track reported to the corresponding date for 15 years has been:

Miles.	1886.	1887.	1888.	1889.
	509	1881.	906	1876.
	299	1880.	1,096	1875.
	543	1879.	391	1874.
	973	1878.	267	1873.
	1,876	1877.	269	1872.
				932

These figures include *main track only*, second or other additional tracks and sidings not being counted.

NEW PUBLICATIONS

A Treatise on Belts and Pulleys. By J. Howard Cromwell, Ph. D., author of *A Treatise on Toothed Gearing*. Published by John Wiley & Sons, New York.

This is a very complete treatise on the subject, and will be useful to many who are called upon to proportion belts and similar gearing under novel or unusual conditions, where rule-of-thumb experience is of little service. Those whose mathematical knowledge is somewhat rusty may at first sight be daunted by the numerous algebraical formulæ, with which the pages are adorned; but the superabundance of equations is more apparent than real. Each step in equating is worked out in full, and is, therefore, easily followed, especially as no very high mathematics are used. The book contains numerous tables, and is well illustrated.

The preface contains an interesting example of the difference of opinion that exists among accepted authorities as to the proper size of a belt. Under precisely similar circumstances, the width obtained by using the formulæ of the undermentioned authors is as follows:

Haswell.	42 in.
Arnold.	39.8 in.
Uwin.	39.3 in.
Nystrom.	31.7 in.
Reuleaux.	18 in.

The author points out that the strength of leather varies considerably, and that the strength of a belt also depends largely on the mode of lacing adopted.

Valuable information is given on the subject of wire cables and ropes. We could wish, however, that the author had treated the subject of cotton ropes more fully, as, when properly made and cared for, they have been found an invaluable means of transmitting power to small workshops isolated from the main factory, a duty for which most methods of conveying power are wholly inapplicable.

The book would also have been much improved had the author followed the method of Mr. Thomas Box in his excellent treatise on Mill Gearing and quoted examples from actual practice, giving the power transmitted, number of revolutions, size of pulleys and other dimensions, and completed the information by stating whether the results were satisfactory in practice or not. It would also have been better if

the tables showed the sizes required, under given conditions, in inches. The constants given require to be multiplied, and though no one would object to spend some time and labor over the calculation of pulleys and belting of very large or unusual size, it is convenient to be able to read off the dimensions in ordinary cases at once.

Foreign Technical Notes.

A new station has been built at Pisa, in Italy, in consequence of the increase of traffic from the Gotthard Railroad. The station is 498.2 ft. long by 121½ ft. broad, with a wall on one side and piers connected by arches on the other, with three pairs of tracks. The roofing is flat zinc plate on wooden sheathing with a glass zone along the ridge 36 ft. wide. The cost was 94 cents per square foot.

The Prussian State Railroad management at Görlitz has arranged a system of telegraphic signals by whistle to enable its locomotive runners to inform the switchman in the signal towers what tracks they are to take—each set of crossings, such as to water crane, to engine-house, to turn-table, or to any given siding being represented by a letter. This system has been in operation two years with great satisfaction.

The Dutch railroads recently instituted a trial of three years duration of four paints, viz., a red-brown paint, known on the continent as English red, two iron oxides, and red lead. Each paint was tried on eight plates, four of which were prepared by immersing in acid, washing in hot water and oiling while warm. The other four were brushed and rubbed until entirely clear of rust or scale. The result was largely in favor of the red lead with both kinds of preparation. The English red was the least durable on both. The acid and oil preparation gave the best results with all the paints.

The apparatus for registering the speed of trains, in use on the German railroads, has been improved by the famous firm of Siemens & Halske. The position of the train at any point on the track is registered by means of an apparatus consisting of two upright vessels containing quicksilver and communicating with each other, one of which is exposed to pressure on the rail, which causes the mercury to fall in it and rise in the other vessel until it reaches a wire and closes a circuit, which causes a small knife in the station to cut a square-cornered hole in the strip of paper, which travels at a uniform speed, so that the time when any point on it passed the knife is known. Siemens & Halske have delivered 1,505 of the track apparatus and 318 of the station apparatus.

Glaser's Annaler gives a method of ascertaining the durability of a given paint as follows: The paint to be tested is laid on in a thin layer on a glass plate. The plate is then placed in a water bath (meaning apparently in a receptacle kept hot by water below), kept at a constant temperature of 212° F., and supplied constantly with air freed from dust for 48 hours.

On the paint thus dried is laid a steel roller with three wedge-formed ridges around it. If the plate is inclined the ridges leave fine lines whose breadth is a measure of the hardness of surface of the paint. If the roller is now loaded so that in rolling the ridges cut through to the glass surface, the disturbance of the paint surface caused by the cutting is a measure, according to Master Mechanic Jähns, of the durability of the paint, the ridges causing strains in the paint layer which fairly represent the effects of weather, the drying process used having had an equal effect in drying out the volatile portions of the paint to that produced in the usual life of paint by the open air.

In 1884 23 kinds of paint were tried in this manner, and judgment was also passed upon separate specimens of the same paints by experts. After six months exposure of all the specimens, the following results were obtained: The judgment of the expert agreed with the roller test and with the test by exposure in 14 cases.

In eight other cases the roller test agreed with that by exposure, while the expert was at fault.

In one case both expert and roller tests were at fault. Hence, the roller test was right in 96 per cent. of the cases, and the expert in 69 per cent.

The French Transatlantic Steamship Company seems to have got ahead of our own railroad companies in the enterprise it is showing in obtaining steerage passengers. It has had trains of emigrant vans built which run once a week between Basle and Havre in 22 hours and between Modena and Havre in 28 hours, without change. These cars are built American fashion with places for 80 passengers. The seats and their backs are upholstered—contrary to the usual custom with third-class cars—and the backs are high enough to give support to the head and cut off draughts. The cars are lighted by oil lamps and steam-heated, and provided with water-closets. A special feature is the arrangement of the baggage nets so that they can be used for baby cribs each car being furnished with eight double and four single ones. The double ones can be divided into two by a partition. These cribs are made of galvanized iron wire and provided with mattresses and with leather straps to keep the children from falling out. Every train is also provided with a restaurant car, where food and drinks can be had at cost price.

These cars are divided into two parts, only one half being used as a restaurant, the other half serving for passenger transport. The restaurant has an eating counter, coffee machine, two boilers and a sink. The cars have iron trucks and are provided with West-

inghouse brakes and electric train-signals and weigh complete 25.4 gross tons. The corresponding third-class European cars—that is, two to one of this pattern—weigh 20 to 23 tons, but are not nearly so comfortable or convenient. It is certainly a palatial style of emigrant travel.

As evidence that it is not necessary to make a road of narrow gauge in order to make it cheap, Mr. Gustav Ebermayer cites the experience of the Bavarian State Railroads in the *Journal of the German Railroad Union*. It has built and is building several local railroads with the greatest simplicity and cheapness, but all but one of standard gauge. One of these cost \$10,772 per mile for road and \$2,543, while right-of-way worth \$1,055 per mile was donated.

A second cost \$12,367 for road, \$2,036 for equipment, and received gifts of \$3,202 worth of land per mile; a third required \$10,144 for road, \$1,981 for rolling stock, and received \$842 worth of land per mile. The narrow (metre) gauge railroad cost \$16,099 per mile, \$4,910 for rolling stock, and received land that would have cost \$1,326. It was over more difficult ground. It is noticeable, however, that the superstructure above the earthwork, etc., of the narrow-gauge road cost but \$210 per mile less than on two of the standard-gauge roads, and \$780 less than on the other. The earthwork cost very much more for the narrow-gauge road—five times as much as one of the others. They are all in a mountain country; the sharpest curve is 60 metres (196 ft.) radius, which was considered inadmissible for a standard-gauge road, and was apparently the reason for choosing the metre gauge for this line, which has grades of 132 ft. per mile, as has one of the standard-gauge lines. The sharpest curve on the latter is 150 metres (490 ft.). All the roads have iron sleepers, longitudinal for the standard-gauge roads, with steel rails, together weighing 163 lbs. per yard, while the narrow gauge has cross-ties weighing only 43 lbs. each, with rails weighing 31 lbs. per yard, the whole, with fastenings, etc., weighing 123 lbs. per yard of track. The track of the standard gauge is calculated for a weight of 11,000 lbs. per wheel; that of the narrow gauge for only 6,600 lbs. The cheapest narrow gauge railroad in Germany, which is of 30-in. gauge, cost \$10,169.

A communication from Herr M. Honigmann in the *Organ* describes a new method of evaporating the water out of the caustic soda solution used in his fireless locomotives after it has become too dilute to be effective in heating. The method consists in inverting the process. The soda remains in its own tank adjacent to the water-boiler, into which high-pressure steam is turned from a stationary boiler. The raised temperature of the water communicates itself in turn to the soda, and the latter being left in communication with the air, the water in it is driven off until the boiling point of the soda solution is equal to the temperature of the steam which is being used for heating. The soda engine is now disconnected from the stationary boiler and is ready to resume work.

The special application of this method of soda evaporation is for mining use, where the evaporation of the soda underground or its transport to the surface for evaporation would be inconvenient. By attaching a steam-pipe brought down a shaft to the locomotive over night, the latter can be at the same time replenished with perfectly pure water from the high-pressure steam condensed into its boiler, and have its soda re-concentrated for use the next day.

The work given out by a soda engine operated thus is compared with that of a Lamm-Franco hot-water engine fed in the same way.

Assuming a solution of 100 parts of soda to 70 parts water, 18,700 lbs. of the solution will take up 7,700 lbs. of steam at a temperature of 320° F., with a final back pressure of 20 lbs., and in doing so will have maintained an average steam pressure in the boiler of 67½ lbs.

The hot-water boiler of corresponding capacity, that is 18,700 + 7,700 + 2,000 lbs. (last item is balance of water always remaining in soda-engine boiler), or 28,600 lbs. will evaporate 4 to 4½ per cent. of its water, or say 1,236 lbs., and instead of a final working pressure of 55 lbs. it will only have 24 lbs. remaining.

SIGNALS AT THE ALPINE TUNNELS.

Before perfecting the signal arrangements at the Arlberg tunnel, the management examined carefully the arrangements in use at the Gotthard and Mont Cenis tunnels, an abstract of which we give below on the authority of the *Journal of the Society of German Engineers*.

At the Gotthard the gong signals which announce the approach of the train are operated by batteries at each end of the tunnel, each consisting of 54 Leclanché elements. The conductor in the tunnel lies in a channel-shaped iron box with a wooden cover, in which is also carried the business cable. The conductor is surrounded with iron wire and covered outside with tarred hemp. The box is fastened against the tunnel wall, about two metres above the rail level.

The signal apparatus stands in the niches along the walls supported on angle irons carried by two upright pieces of rail resting on a cast-iron bed-plate.

The use of the usual insulators for the movements of these gongs having given rise to disturbances of the traffic through the accumulation of soot, hard rubber spools were tried successfully for insulating the relay wires.

Through the operation of the heat in the tunnel, which gets up to 100° F., with the steam, dust, rust and soot which combine to form a sort of emery, the moving steel portions of the movements become badly worn, and the zinc cover is found insufficient to protect them, owing to necessary openings, through which the tunnel air can penetrate. Cast-iron parts are protected by frequent painting. Iron plates are

metre square having been found unsatisfactory as ground connections, lead pipes bedded in cinder are now being tried.

At the Mont Cenis the gong signals, of which there are but four, are placed upon a wooden base with zinc cover. The batteries consist of 36 Daniells elements, which have to be filled daily, the gongs being set in action by the cessation of the current, while at the Gotthard they work only during the action of the electricity.

The conductor is less perfectly insulated, with lead wrapping, and the connection with the apparatus is less perfect causing frequent imperfection in the signal action. The formation of rust is so rapid that an iron pipe half an inch thick has to be changed out after a short time.

The distance signal at the Gotthard and Mt. Cenis end stations is a disk of red glass shovved by mechanical means before a fixed lantern at the exit from the tunnel.

At the Bardonneche station at the south end of the Mont Cenis, which lies very close to the tunnel, a second signal is placed 2,634 ft. from the tunnel end, which is curved, and directly at the junction with the straight continuation of the tunnel, which was driven for construction purposes; and 656 ft. further in is another signal provided with a green lantern, to call attention to the neighborhood of the regular signal in case the latter should be put out.

Both tunnels have three-way lanterns, so to speak, at kilometre or half kilometre distances, showing white light from parabolic reflectors fore and aft, and the number of kilometres against a green light on the track side. In the Gotthard Tunnel a pedal is arranged at every kilometre to send a signal to the end station, which records the time of passage of the train on a moving strip, answering the double purpose of showing where the train is and recording its speed, according to the system practiced on some of the Prussian roads.

In the Arlberg gongs are placed at every kilometre, that is, nine in the tunnel, in wooden cabins in large niches whose doors are made tight with strips of cloth. The workmen remain in these cabins during the passage of trains: when the doors are open they serve as stop-signals.

The galvanized and painted gongs stand under wooden roofs on the tops of the cabins. The hammer bearings, for simplicity of cleaning, are simple forks with a cover against dirt. The driving weight hangs by a galvanized wire rope to a double sheaved tackle, and its case on account of rust is closed by lead weights instead of a lock. The movement stands in a zinc box upon a zinc plate stiffened by galvanized iron ribs. The hammer wire passes out of the box through a porcelain insulator through the smallest practicable opening. The opening for the winding key is closed by a slide; that for the signal key by a weighted lid. The slit for the wire rope is made as tight as practicable with water-proofed linen.

Wherever possible phosphor-bronze is used to avoid rust. The signal key is on the front of the apparatus. It stands upon an angle-iron, whose support forms the ground connection. The key, its spring, etc., are covered by a rubber cloth, which is not removed when the key is used.

The cable, which is of galvanized wire, is carried into the housing, its entry into the latter being plugged with wax so as to be easily removed, and the conductor is only uncovered where it passes under the connection screw.

In laying the cable two to five metres slack is allowed at each apparatus to avoid splices.

The signal apparatus is put into the return current, because it has been found that with this arrangement losses of current have less effect on the regularity of the signals. Five block stations are used for the tunnel, three inside and two out, the Siemens & Halske system being used without the semaphores, and with the necessary covering for the movements.

In order to avoid every possibility of letting two trains upon the same track in the tunnel from opposite ends at the same time, the station semaphores at each end of the tunnel, which are, of course, in connection with the tunnel block system, are also connected together so that one cannot be operated unless the other signalman allows it.

Since the first block stations in the tunnel are 6,560 ft. from its ends, the stations at the ends, viz., St. Anton and Langan, need special distance signals, especially as their end switches lie close to the entrances, and at the east end a falling grade of $\frac{1}{4}$ per cent reaches nearly to the station. The usual revolving disk of the Siemens & Halske apparatus is replaced in these by a four-armed star with a glass spectacle on each point, two opposite ones being respectively red and green, and the other two white. The star is turned by the electric apparatus, and by bringing one point or the other before the lantern can, of course, give white red or green signals.

This signal is out of sight of the station to be protected, and it is to be presumed has an independent tell-tale to check its position, although none is mentioned.

In the Gotthard, when both tracks are in operation, crossings of trains in the tunnel are avoided. On the Mount Cenis they are very common, but in this tunnel the end stations adjoin block stations, so that two trains on the same track in the tunnel are not allowed.

At Mount Cenis compressors deliver 7,000 cubic meters of air daily to the tunnel, and also fresh water, for the delivery of which at desired points in the tunnel cocks are supplied.

Both the Mont Cenis and the Gotthard tunnels are divided into four track-walking sections, the time on duty being eight hours. At the Gotthard the track-walker is allowed a half hour's rest, after each half of his shift, in fresh air chambers, in which a record is made by him of the direction of the air-draught, and of the barometer and thermometer readings.

Track maintenance is carried on by gangs of six men and a foreman, in eight-hour shifts.

TECHNICAL.

Locomotive Building.

Mr. A. M. White, Superintendent of the New York Locomotive Works, of Rome, N. Y., has accepted the position of Assistant Superintendent of the Schenectady Locomotive Works, to take effect in May. The Schenectady Works are quite busy, turning out 18 engines per month. Have recently finished three 18 by 24 in. cylinder passenger engines for the Lake Shore & Michigan Southern; four 18 by 24 in. cylinder ten-wheel engines for the Boston & Lowell and ten 18 by 24 in. cylinder ten-wheel engines for the Chesapeake, Ohio & Southwestern, and are now at work on orders for the New York Central, the Chicago & Northwestern, the Chicago, St. Paul, Minneapolis & Omaha, the Wisconsin Central and the East Tennessee, Virginia & Georgia roads.

The Portland Company in Portland, Me., is building 4 heavy passenger engines and 1 freight engine for the Maine Central road. The locomotives will be the heaviest yet put on that road, and will be run upon the Mt. Desert fast freight.

The Rogers Locomotive Works in Paterson, N. J., have several orders in hand.

The Car Shops.

The Pennsylvania Railroad shops at Altoona have just completed 8 new passenger cars for service on local trains on the Pittsburgh Division.

The Marquette, Houghton & Ontonagon shops in Marquette, Mich., have just completed 30 new ore cars for the road, besides repairing and rebuilding a large number in preparation for the shipping season.

The American Brake Co. in St. Louis has its new warehouse completed and nearly all its new machinery in operation. This will largely increase the capacity of the shops and will enable the company to keep up with its orders for freight car brakes.

The Jackson & Sharp Co. in Wilmington, Del., has just completed a passenger car for the Americus, Preston & Lumpkin road in Georgia.

Car Couplers.

The Brunswick & Western Railroad Co. in Georgia has adopted the United States car coupler as the standard for its road, and has signed contracts providing for its use.

The total cost per car of this coupler, with malleable iron draw-bars and including royalty, is stated by the company at \$13.

Bridge Notes.

The new bridge over the Connecticut River between Windsor Locks and Warehouse Point, Conn., is a wire suspension structure, carried on four iron towers measuring 50 ft. to the saddles, and resting on two piers of solid masonry 35 ft. high. The cables are each composed of seven 2-in. galvanized steel wires, the ropes bound together with cable bands at intervals of 7 ft. The centre span of the bridge is 547 ft., and the land spans 301 $\frac{1}{4}$ ft. each, making the total length between the abutments 1,150 ft. The width is 20 ft., and the camber of the arch 11 $\frac{1}{2}$. The iron work, including the trussing and the towers, was made by the King Bridge Co. at Cleveland, O., and the cables and wire work were furnished by the John A. Roebling's Sons Co., of Trenton, N. J. W. Shipman, of New York, was the contractor, indorsed by the Roebling Co., bidding \$55,000 for the work. His only competitor was R. F. Hawkins, of Springfield. The work was begun early in July, 1885, and according to the contract stipulations was to have been finished by Jan. 1. The contractor is supposed to have been unfortunate in making his bid too low, and the actual cost of the work has probably exceeded the sum named by several thousand dollars. Mr. Shipman has now given over the work to the charge of the Roeblings, who will put the finishing touches on his work.—*Springfield (Mass.) Republican*.

The Chicago, Burlington & Quincy shops at Aurora, Ill., have just completed a draw-span 195 ft. long for the new bridge at Quincy, Ill. The bridge will be 600 ft. long in all.

Iron and Steel.

Fairchance Furnace in Fayette County, Pa., has gone into blast again, the repairs having been completed. This furnace is one of the oldest in Western Pennsylvania, the first stack having been built in 1794.

The Junction Iron Co. has contracted for the building of another blast furnace at Mingo Junction, O. The new furnace is to be 80 ft. high and 20 ft. bosh.

Crozer Furnace at Roanoke, Va., has gone into blast for repairs.

The Coosa Furnace Co. at Coosa, Ala., had its furnace put summarily out of blast last week, the stack being 3 ft. under water during the great freshet.

Manufacturing and Business.

The Harrington & King Perforating Co., manufacturers of perforated sheet metal of all kinds in Chicago, have a number of orders on hand for perforated metal for locomotive smoke stacks and extended smoke boxes, and also for car ventilators, air brakes and air compressors. This company furnishes sheet metal perforated to any size and shape of hole, down to a great degree of fineness.

The Putnam Tool Co. of Fitchburg, Mass., has been consolidated with the Putnam Machine Co. of the same place, under the name of the Putnam Machine Co. A large addition is now being made to the works.

The Stewart & Mattson Manufacturing Co. of Philadelphia, manufacturer of brass goods, car fittings, etc., have large orders on hand for the Pennsylvania Railroad Co. and also for Cramp & Sons, the ship builders.

The Rail Market.

Steel Rails. There is much inquiry reported, and quotations are steady at \$35 per ton at Eastern mills for early delivery and \$34.50 for later orders.

Rail Fastenings. Quotations are unchanged at 2.40 cents per lb. for spikes in Pittsburgh; 2.75@3.10 for track-bolts and 1.65@1.75 for splice bars.

Old Rails. Old iron rails are dull and in light demand, with some small sales reported at \$20.50@\$21.50 per ton at tide-water. Old steel rails are quoted at \$21@\$22 per ton in Pittsburgh.

Engineers' Club of Philadelphia.

A regular meeting was held at the Club's house in Philadelphia, April 3, President Washington Jones in the chair; 22 members and 2 visitors present.

The evening was spent in an interchange of views as to how to best promote a more extended discussion of the numerous subjects brought before the Club. Various methods of bringing the original papers to the early attention of members likely to discuss them were proposed. The subject was finally referred to the Publication Committee.

Engineers' Club of St. Louis.

A regular meeting was held in St. Louis, April 7, President McMath in the chair, 18 members present. Messrs. Wm. T. Angell and Wm. D. McQueston were elected members.

Mr. Robert Moore, the delegate from this club to the meeting of the Civil Engineers' Committee on National Public

Works, held at Cleveland March 31 and April 1 and 2, reported, giving an account of the proceedings of the convention.

Mr. Robert Moore read a paper on "Tables for Determining the Sizes of Sewers, by Kuyler's Formula." This paper was discussed, followed by a general discussion. The club then adjourned.

The Frost Light for Cars.

Combination car No. 719, lighted by the Railway Lighting & Heating Co., of Philadelphia, has been placed in regular service on the Pennsylvania Railroad's New York and Chicago Limited Express. Car No. 718, lighted by the same system, is in regular service on the New York division of the Pennsylvania Railroad.

Testing Car Axles.

The new axle tester recently erected north of the car department engine-room was tried a few days since. The apparatus consists of a tall frame-work in which a 1,640-lb. weight can be raised to a height of 30 ft. by power derived from the engine shaft. The test is employed a few days since consisted in raising the weight 10 ft. and letting it fall upon the axle. An old axle taken from a foreign car was broken in twain by the first fall of the weight from that height, while a new C. B. & Q. axle was only bent 8 in. by three such falls.—*Aurora (Ill.) Beacon*.

The Meigs Elevated Road.

On Friday last the train, consisting of engine, tender and passenger car, on Meigs' elevated road in Cambridge, was made up for the first time and ran around the 50-ft. curve with the greatest ease. Yesterday the legislative joint committee on street railways visited the road and witnessed a trip over the track. The engine mounted the 345-ft. grade without the slightest difficulty. A loosely-fastened rail was ripped off without any effect on the train. The members of the committee were much pleased with the exhibition, and listened with the closest attention and interest to Capt. Meigs' explanation.—*Boston Herald*, April 20.

American Society of Mechanical Engineers.

At the spring meeting of the American Society of Mechanical Engineers in Chicago, beginning May 25, the following papers will be read:

Wilfred Lewis: Experiments on Transmission of Power by Belting.

Wm. O. Webber: Relative Efficiency of Centrifugal and Reciprocating Pumps.

Horace See: Production of True Crank Shafts and Bearings.

George H. Babcock: Substitutes for Steam.

Chas. W. Barnaby: New Steam Engine Indicator.

F. G. Coggin: Novel Chimney Staging.

Thomas S. Crane: Water Purification for Manufacturing and Domestic Consumption.

H. R. Towne: The Engineer as an Economist.

H. Metcalfe: Shop Orders and Accounts.

C. M. Woodward: Manual Training Schools.

O. Smith: Inventory Valuation of Machinery Plant.

Frederick W. Taylor: Value of Water-gas and Gas from Siemens Producers for Melting in Open Hearth Furnaces.

Wm. P. Trowbridge: Ventilation by Heated Chimneys and Fans.

Thomas D. West: Irregularities in Contraction of Duplicate Castings.

C. M. Giddings: Dynamometer for Measuring Power Required to Move Slide Valves.

John H. Cooper: Grain Handling in California.

A New Steam Ferry-Boat.

The new steam ferry-boat now building by the New England Shipbuilding Co. of Bath, for the Maine Central Railroad, is to be placed upon the route between Bar Harbor and Mt. Desert Ferry early in the spring; it was launched this week, and is thus described.

The vessel is 156 ft. long, 26 ft. wide and 10 ft. deep, and built with special reference to speed and the peculiar necessities of its route between the railroad terminus at Hancock and Bar Harbor. In several respects the steamer is a novelty. Its hull has no guards, but very flaring sides, and below the water line is nearly circular in form. This shape gives the same amount of deck room and also the same breadth of hull at the load line, and presents a much easier shaped side to the action of the waves in rough weather than a boat with guards. It is also lighter in weight for the same strength of structure; and with a long boiler of small diameter placed low down in the hull, the boat's stability will be very great.

On the main deck is a ladies' cabin, 38 ft. long by 15 ft. wide, handsomely upholstered, from which is partitioned off at the after end a commodious lavatory and toilet-rooms. From the centre of the ladies' cabin, a handsome staircase ascends to the main saloon. This main saloon is 77 ft. long, and has an average width of 15 ft. and a height of 7 ft., and is surrounded by a broad dome skylight of graceful design, lighted with softly tinted glass, extending the whole length of the saloon. The entire sides and after end of the saloon are fitted with large windows, and around the sides richly upholstered seats. Just here appears one of the great advantages of the screw over the side-wheel as a propelling agent for boats of this class. Instead of the inclosure for the machinery dividing this saloon for the best part of its length into two narrow and dark alley-ways, and the view from the side windows being obstructed by large paddle-boxes, this steamer has practically a clear saloon, well lighted for its whole length and breadth, the windows affording an uninterrupted view in every direction. The saloon deck extends outside the saloon both forward and aft, and for a comfortable width along the sides, affording a fine outside promenade. The boat is handsomely furnished, and the management has introduced several novelties in the way of little comforts not usually obtainable by the weary traveler until he gets to his hotel. One of the chief objections hitherto to the use of the screw-propeller for fast passenger boats has been the excessive vibration of the after part of the vessel, which is inevitable with the old-fashioned single engine, and to some extent with the two-cylinder compound engine, as may be seen in several well-known, and in other respects successful boats about New York. With view to reducing this source of discomfort to a minimum, the management decided to adopt for their steamer the three-cylinder engine, with cranks at 120 degrees, which has been found to be in this respect a great improvement over anything previously used, and the triple expansion engine was decided upon as being, all things considered, the best form of three-cylinder engine. It is expected that the engines will develop about 600 indicated H. P. They are of the open-front style, rendering them accessible in all parts, and have steam reversing gear, independent pumps and all the recent improvements to be obtained. The steam will be supplied by a straight-through boiler with three furnaces, using a moderate forced draught. The boiler is of steel, but strapped inside and out, treble-riveted and adapted for a steam pressure of 160 pounds. The propeller is of an original design, four-bladed, and intended for a high number of revolutions.

The boat is to be furnished with all the usual life-saving appliances, and with very perfect pumping and fire ap-

paratus. The hull is of oak and hard pine, and being iron-strapped, it will be light and very strong. The hull, joiner-work and appointments have been designed complete to every detail by Mr. William P. Patten. The designing and construction of the machinery is by Mr. C. E. Hyde, Superintendent of the New England Ship Building Co.'s iron works, under whose supervision was built the first triple-expansion engine constructed in this country. That engine proved to be the only one that could be placed in the domed steamer 'Meteor,' and from which any speed could be obtained by the boat."

A Novel Locomotive.

An engine of singular design has just been completed at the Grant Locomotive Works, Paterson, N. J. Mr. Raub, the patentee, has, it is stated, spent nearly 40 years in elaborating the details of the engine. The main idea has been to place the cylinders, fire-box, dome and all important working parts as near as possible to the centre of the engine. The cylinders are vertical and drive a central dummy axle carrying wrist pins, from which power is transmitted to two pairs of drivers in front, and two pairs behind. The engine carries water and fuel in side tanks, and is intended to run in either direction. Two fire-boxes and boilers are used, and the firing is done from the sides as in the four-cylinder Fairlie engine. The chimney passes through the dome and is situated in the centre of the engine. Smoke-boxes are situated at each end of the engine and the products of combustion pass from the smoke-boxes by return flues to a central chamber and thence into the stack.

THE SCRAP HEAP.

An Inventor.

The sleeping car porter was the original boycotter. He learned a quarter of a century ago how not to make the quarters of those passengers comfortable who neglected to tip him his little quarter.—*Chicago Journal*.

Dangerous Freight.

A dispatch from Appleton, Wis., April 17, says: "While employees of the Milwaukee, Lake Shore & Western Railroad were transferring eight cans of giant powder from a car to the freight station at Clintonville this morning, one of the cans exploded, and the others followed in quick succession from the effects of the concussion. Arthur Edwards, the station baggage-master, was instantly killed. James Ringwood, the night operator, was so badly burned and cut about the head that it is feared he cannot live. John Faas, a brakeman, who was on top of the car, was blown over the tracks and over a wood pile to a distance of 50 ft., was badly burned and lacerated, and will probably die. John Gagnon, a brakeman, was also burned and cut about the head and face. George Sturm, another brakeman, was terribly burned, his clothes being nearly burned off. Frank Quinn, who was employed about the station, and at the time of the explosion was at work in the next car, was struck by a flying board, which was driven through a car, and was also painfully burned while trying to help Sturm. George Hollister, the conductor, had his hair and beard burned off, and was also struck by a flying board. The car and half the freight station was destroyed, and the brick walls of a building several hundred feet distant were shaken down."

An Epitaph.

The following epitaph on a passenger killed by a train derailment, which was also "bad for the coo," is sent us as a fact by a correspondent who is *usually* truthful:

"A bovine waif from an adjoining field
"The track invaded, and my fate was sealed.
"She struck the cowcatcher and was knocked heavey-high,
"And thus, I hope, dear reader, so shall I."

Duplicating a Name.

A dispatch from Mattoon, Ill., April 12, says: "Last week people were surprised to learn that the Secretary of State had granted a charter to the Indianapolis & St. Louis Railway Co., the incorporators being well known Mattoon parties, and the company being organized for the ostensible purpose of building a railroad from East St. Louis to Terre Haute, Ind. On the face, it looks as though the new charter was secured to steal the name of the well-known Indianapolis & St. Louis Railway. Some years ago the road was known as the Indianapolis & St. Louis Railroad. Because of some proceedings in bankruptcy it became necessary to change the name, which was done by calling it a railway instead of a railroad. But no charter was secured in Illinois under the new name, and nothing stood in the way of the Mattoon parties securing the name as related above. What will be the outcome of it all, is now a matter of conjecture."

A Solid Company.

The Boston & Providence Railroad has declared a semi-annual dividend of 4 per cent., payable May 1. This road began paying dividends in 1835, and has since then distributed 370 per cent., an average of above 7 per cent. a year. The average was greatly assisted by the payment of 10 per cent. annually from 1867 to 1874, inclusive. Nine per cent. was paid in 1875, then 8, then 6; in 1879, 7½ per cent., and since then 8 per cent.—*Boston Advertiser*.

The Language of the Train.

To sit on one seat and put your feet on another signifies, "I am not accustomed to upholstered furniture at home." To occupy four seats on one ticket means, "I am a hog." To lean half-way out of the window in order to see the country means, "There are no glazed windows in my house." To turn a front seat and ride backward, staring the whole car in the face means, "I may not be pretty, but I think I am." To expectorate on the car floor means, "I have no carpets at home." To say of the station that "you cannot see the town for the houses," signifies, "I have never been anywhere before." To drink all the water in the tank and go to sleep at eight o'clock in the morning means, "I was out with the boys last night." To be bounced off the train signifies, "I am dead broke." To chase your children away from your own seat to be entertained by the other passengers signifies, "I cannot afford to keep a nurse." To talk so loud the whole car can't help hearing you signifies, "I am telling all I know." To bore a reluctant stranger with your conversation signifies that you ought to be taken out and shot. To eat your dinner with both hands means that you would eat like a gentleman if the railway company gave you time. To whistle in the car signifies that you have no ear for music. To drum on the window with your fingers shows that you do not know how to drum. To walk through the car with a lighted cigar in your mouth indicates that it is your first cigar. To do any or all of these things just when you feel like it signifies that you are away from home and are going to enjoy yourself in your own way, and you don't care who knows it. To be run over by a truck load of theatre baggage on the platform signifies, "I seem to be in the way." To go into the restaurant and come out wiping your mouth with the back of your hand signifies, "I am a prohibitionist, but I am not bigoted." To change a \$50 bill for a plain, old farmer from Schoharie means, "I am out \$50." To run up town five minutes when the train stops only three means, "I am liable to get left." To buy an expired limited ticket over

the Boston & Maine from a scalper and try to ride over the Eastern Railroad with it means, "I am a fool." To save a half-fare by telling the conductor that your nine-year-old boy will be five next June means, "I am a liar." For 95 passengers to get into a car that will seat 50 means, "Somebody is going to stand up."—*Burdette, in Pathfinder Guide for April*.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atlantic & Pacific, annual meeting, at the office in Boston, May 20.

Canadian Pacific, annual meeting, at the office in Montreal, May 12.

Central, of New Jersey, annual meeting, at the office in Jersey City, May 7.

Chicago, Burlington & Quincy, annual meeting, at the office in Chicago, May 19.

Chicago & Northwestern, annual meeting, at the office in Chicago, June 3. Transfer books close May 5.

Delaware & Hudson Canal Co., annual meeting, at the office in New York, May 11, at noon.

Lake Shore & Michigan Southern, annual meeting, at the office in Cleveland, O., May 5.

Michigan Central, annual meeting, at the office in Detroit, May 6.

New York, Susquehanna & Western, annual meeting in Jersey City, May 6.

St. Louis, Alton & Terre Haute, annual meeting, at the office in St. Louis, June 7. Transfer books close May 8.

St. Louis & San Francisco, annual meeting, at the office in St. Louis, May 12.

Vicksburg & Meridian, annual meeting, at the office in New York, May 8, at noon.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Atchison, Topeka & Santa Fe, 1½ per cent., quarterly, payable May 15, to stockholders of record on April 22.

Baltimore & Ohio, 4 per cent., semi-annual, payable May 15. This company drops from 5 to 4 per cent.

Boston & Providence, 4 per cent., semi-annual, payable May 1, to stockholders of record on April 19.

Cincinnati, Hamilton & Dayton, 3 per cent., semi-annual, payable May 3, to stockholders of record on April 19.

Pullman's Palace Car Co., 2 per cent., quarterly, payable May 15, to stockholders of record on May 1.

Railroad and Technical Conventions.

Meeting and conventions of railroad associations and technical societies will be held as follows:

The Railroad Department of the Young Men's Christian Association will hold the fourth International Conference in Milwaukee, Wis., beginning at 7:30 p. m. on Thursday, May 6.

The American Society of Mechanical Engineers will hold its next meeting in Chicago, on Tuesday, May 25.

The Master Car-Builders' Association will hold its annual convention at Niagara Falls, beginning on Tuesday, June 8.

The Master Mechanics' Association will hold its annual convention in Boston, beginning on Tuesday, June 15.

The Master Car-Builders' Club will hold its regular monthly meetings at the rooms, No. 113 Liberty street, New York, on the evening of the third Thursday in each month.

The New England Railroad Club will hold its monthly meetings at its rooms in the Boston & Albany passenger station in Boston, on the evening of the second Wednesday in each month.

The Western Railway Club will hold its regular monthly meetings at its rooms, No. 108 Adams street in Chicago, on the third Wednesday in each month.

Tests of Freight Train Brakes.

The meeting of the Committee of the Master Car-Builders Association on continuous Brakes for Freight Trains is adjourned till April 28, when it will be held at the Bolton House, Harrisburg, Pa., the place heretofore selected.

Association of Railroad Superintendents.

The Association of American Railroad Superintendents met in Cincinnati, April 16, with a fair attendance. The old officers were re-elected for the ensuing year, and New York was chosen as the place for the next meeting. No business of special importance was transacted.

General Time Convention.

At the meeting of the General Time Convention in Cincinnati last week, a brief account of which was given last week, it was decided to consolidate the General and the Southern time conventions into one body, and hereafter only one time convention will be held. The fall meeting will be held in New York. The attendance at the Cincinnati meeting was large.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—At the annual meeting in Topeka, April 15, the following directors were chosen: C. K. Holiday, Topeka, Kan.; E. B. Purcell, Manhattan, Kan.; L. Severy, Reading, Kan.; George Sealy, Galveston, Tex.; I. T. Burr, Benjamin P. Cheney, C. R. Codman, A. W. Nickerson, Warren Sawyer, George O. Shattuck, Alden Speare, Wm. B. Strong, W. F. Wharton, Boston. The only new director is Mr. Sealy, who succeeds S. A. Kent, of Chicago, and who is President of the Gulf, Colorado & Santa Fe Co. The board re-elected the old officers, as follows: President, W. B. Strong; First Vice-President, C. W. Smith; Second Vice-President and Chief Engineer, A. A. Robinson; Secretary and Treasurer, E. Wilder; Assistant Secretary and Treasurer, F. L. Goodwin; General Solicitor, George R. Peck; General Counsel, G. W. McCrary; Comptroller and General Auditor, J. P. Whitehead; Auditor, H. C. Clements; Transfer Agent, H. A. Glasier; Clerk of Board, C. A. Higgins.

Cedar Falls & Minnesota.—This company, whose road is leased to the Illinois Central, has elected directors as follows for three years: A. B. Stickney, St. Paul, Minn.; J. Kennedy Tod, New York; C. W. Benson, London, England.

Central Transportation Co..—At the annual meeting in Philadelphia, April 19, the following officers were elected: Directors, John S. Stevens, William H. Lucas, Matthew Brooks, George K. Reed, B. F. Oddyke, Evan Morris, William O'Hara Scully, James Spear, Joseph D. Wilson; Secretary and Treasurer, Frank Weekley.

Chesapeake, Ohio & Southwestern.—At the annual meeting last week the old directors and officers were re-elected.

Chicago Railroad Association, Passenger Department.—At a meeting held April 15 the following officers were elected for the ensuing year: William S. Baldwin, President;

A. V. H. Carpenter, Vice-President; Charles H. Grant, Secretary; A. H. Hanson, James Charlton, and W. A. Thrall, Executive Committee.

Cincinnati, Lebanon & Northern.—This company has elected directors as follows: A. D. Bullock, George Hafer, A. M. W. Neff, Briggs Swift, A. S. Winslow, J. Willshire, Cincinnati; E. J. Brown, Boston.

Cincinnati, Wabash & Michigan.—At the annual meeting in Wabash, Ind., April 14, the old directors were re-elected. The board subsequently re-elected Jephtha H. Wade, President; Wm. S. Jones, Secretary and Treasurer; Norman Beckley, General Manager; O. W. Lampert, Superintendent; E. D. Wheeler, Auditor; Owen Rice, General Freight and Passenger Agent; C. E. Cowgill, Attorney.

Delaware, Lackawanna & Western.—Mr. Ira S. Beers is appointed General Western Passenger Agent, with office in Buffalo, N. Y., in place of E. H. Hubbard, resigned.

Fairchild & Mississippi River.—This company has elected officers as follows: President, N. C. Foster, Fairchild, Wis.; Vice-President, S. W. McCaslin, Eau Claire, Wis.; Secretary, G. A. Foster, Fairchild, Wis.; Treasurer, E. J. Foster.

Galesburg & Rio.—The directors of this new company are: Frank S. Bagg, C. W. Darrow, W. J. Fabin, L. O. Goddard, J. L. Lathrop, all of Chicago.

Gulf, Western Texas & Pacific.—At a meeting held in Cuero, Tex., April 8, the following directors were elected: C. P. Huntington, C. C. Rocker, A. C. Hutchinson, F. S. Stockdale, D. C. Proctor, C. C. Gibbs and M. D. Monserate. The following officers were elected by the board: M. D. Monserate, President and Treasurer; F. S. Stockdale, Vice-President; D. C. Proctor, Secretary.

Indiana.—The directors of this company, successor to the Chicago & Great Southern, are: H. T. Carpenter, C. P. Coffin, James W. Ferry, Henry A. Gardner, H. H. Gray, R. D. McFadden, H. H. Porter, Robert Spencer.

Janesville & Evansville.—The directors of this new company are: Charles Atwood, Levi B. Carle, J. J. Pease, Jameson, Wis.; Charles E. Simmons, Oak Park, Ill.; Marvin Huggett, Albert Keep, J. B. Redfield, C. C. Wheeler, Chicago.

Missouri Pacific.—The following circular from General Superintendent William Kerrigan is dated St. Louis, April 8: "Mr. E. K. Sibley having resigned as Superintendent of the Missouri Pacific and Missouri, Kansas & Texas Railroads, north of Denison, Mr. F. B. Drake is hereby appointed Superintendent of the Missouri Pacific Railroad, with headquarters at Sedalia, Mo. Mr. J. F. Frey is hereby appointed Superintendent of the Missouri, Kansas & Texas Railroad, north of Denison, with headquarters at Parsons, Kan. Reports for each road will be made to the respective superintendents."

New York Central & Hudson River.—At the annual meeting in Albany, April 21, the following directors were chosen: Sherman S. Jewett, Buffalo, N. Y.; George C. Buell, Rochester, N. Y.; Erastus Corning, Albany, N. Y.; Wm. Bliss, Samuel F. Barger, Charles C. Clarke, Chauncey M. Depew, Cyrus W. Field, Horace J. Hayden, J. Pierpont Morgan, Cornelius Vanderbilt, Wm. K. Vanderbilt, Frederick W. Vanderbilt, New York. The only new director is Mr. Buell, who succeeds the late Wm. H. Vanderbilt.

New York, Ontario & Western.—On Saturday, May 1, the general offices of this company will be removed from No. 15 Broad street to the Post Building, Nos. 16 and 18 Exchange place, New York. Agents and others will please address reports and other communications accordingly, on and after April 30.

Rome, Watertown & Ogdensburg.—The following circular from President Charles Parsons is dated New York, April 14:

"The Rome, Watertown & Ogdensburg Railroad Co. having this day leased the Utica & Black River Railroad, with its leased line and all the property connected therewith, hereby assumes possession of the same from this date. Mr. H. M. Britton will at once assume the position of General Manager of the entire system, with office at Oswego, N. Y.; officers and employees will respect and obey him accordingly. Mr. J. F. Maynard is hereby appointed General Traffic Manager of the entire system, with office at Utica, N. Y.; officers and employees will respect and obey him accordingly. Mr. E. M. Moore will at once assume the position of General Freight Agent of the entire system, with office at Oswego, N. Y. Mr. Theodore Butterfield is hereby appointed General Passenger Agent of the entire system, with office at Oswego, N. Y."

Mr. Britton has heretofore been General Manager and Mr. Moore General Freight Agent of the Rome, Watertown & Ogdensburg. Mr. Maynard was General Manager and Mr. Butterfield General Freight and Passenger Agent of the Utica & Black River.

St. Louis, Arkansas & Texas.—The directors of this company (successor to the Texas & St. Louis), are: S. W. Fordyce, Hot Springs, Ark.; H. S. Allis, Little Rock, Ark.; S. A. Benas, R. C. Keren, J. W. Phillips, Wm. M. Senter, St. Louis; J. A. Benedict, F. K. Pendleton, J. C. Remis, New York.

Sedalia, St. Louis & Chicago.—The officers of this new company are: President, John B. Jaynes; Vice-President, O. H. Hurt; Secretary, George C. McLaughlin; Treasurer, Philip E. Chappell; Attorney, John Montgomery. Office at Sedalia, Missouri.

Tennessee Coal, Iron & Railroad Co..—At the annual meeting in Nashville, Tenn., April 6, the following were chosen: President, N. Baxter, Jr.; Vice-President, T. M. Steger; directors, J. Bowron, A. S. Colyar, S. Cowan, W. M. Duncan, T. W. Evans, J. L. Gaines, J. H. Inman, W. H. Inman, S. J. Keith, T. S. Marr, J. P. Williams.

Union Pacific.—The President has appointed the following governing directors for the ensuing year: Frederick R. Couder, New York; Edward P. Alexander, Augusta, Ga.; Marcus A. Hanna, Cleveland, O.; Franklyn McDeagh, Chicago; James W. Savage, Omaha, Neb. They are all re-appointed.

West Shore.—At the annual meeting in Albany, N. Y., April 21, the following directors were chosen: Edward D. Adams, Samuel F. Barger, Charles C. Clarke, Chauncey M. Depew, Ashbel Green, Horace J. Hayden, Charles Lanier, J. Pierpont Morgan, Charles Edward Tracy, Cornelius Vanderbilt, Frederick W. Vanderbilt, Wm. K. Vanderbilt, J. Hood Wright.

PERSONAL.

—Mr. H. C. Parker has resigned his position as Traffic Manager of the Peoria, Decatur & Evansville road.

—Mr. E. H. Hubbard has resigned his position as General Western Passenger Agent of the Delaware, Lackawanna & Western,

—Mr. George L. Bradbury has tendered his resignation of his position as General Manager of the Peoria, Decatur & Evansville road, to take effect May 1.

—Mr. Peter H. Peck, Master Mechanic in charge of the Hannibal & St. Joseph shop at Brookfield, Mo., has just been elected Mayor of that thriving little city, by a large majority.

—Colonel R. B. Roberts, for some time past Attorney of the Pittsburgh, Fort Wayne & Chicago Railroad Co., died at his residence in Chicago, April 19. He had been in failing health for nearly a year.

—Mr. William F. Garrison, senior member of the steam pump manufacturing concern of Guild & Garrison, of Brooklyn, N. Y., sailed for Europe April 14. Mr. Garrison goes abroad partly for health and partly on business.

—Mr. Charles E. Loew, who died in New York April 21, was best known as a lawyer and active politician, but was also at one time a director of the Erie Co. He was a member of the Electric Subway Commission for New York city at the time of his death.

—Mr. Cornelius V. Dearborn died at his residence in Nashua, N. H., April 18, aged 53 years. He was well known in his native state as lawyer, editor and business man. He served for several years as a director and Treasurer of the Nashua & Lowell Railroad Co. At the time of his death he was the State Bank Examiner for New Hampshire.

—Mr. Charles Crocker, President of the Southern Pacific Co., was thrown from a light wagon in which he was driving on St. Nicholas avenue in New York, on the afternoon of April 20. Mr. Crocker was picked up and carried to the nearest hospital, where it was found that he had received serious injuries, although it is believed that he will recover.

—Gen. Zenas C. Priest, Superintendent of the Eastern Division of the New York Central & Hudson River road, is certainly the oldest superintendent in active service in this country. He was 80 years old on April 18, and has been connected with the road for over 50 years. Gen. Priest is in excellent health, and is an active and efficient officer, notwithstanding his great age.

—Mr. Magnus Troilius was found dead in his office in Philadelphia on the morning of April 19, having died suddenly from heart disease, it is supposed. Mr. Troilius was a son of General Troilius, Director-General of Swedish Government Railroads, and had been in this country for some time. He was for several years chemist at the Midvale Steel Works in Philadelphia, but for a short time has been agent for the Swedish iron company of Alrutz & Co. He recently published a very excellent work, entitled "Notes on the Chemistry of Iron."

—Mr. E. K. Sibley has resigned his position as Superintendent of the Missouri Pacific and the Missouri, Kansas & Texas roads and will engage in banking business in New York. Mr. Sibley has been connected for 16 years with the Southwestern railroad system, having entered the service of the Iron Mountain road in 1870. In 1873 he was made Assistant General Freight Agent of the old Cairo & Fulton road, and when that road was consolidated with the St. Louis & Iron Mountain he was continued in the same position until 1881, when he was made General Manager of the Memphis & Little Rock road, and the following year was appointed Receiver of that line. In 1884 he went to the Missouri Pacific as Assistant to the Third Vice-President, and about a year ago was appointed to the position which he has just resigned. Mr. Sibley is also one of the Board of Arbitrators of the Southern Railway and Steamship Association.

TRAFFIC AND EARNINGS.

Pacific Coast Association:

The earnings of the lines in the Pacific Coast Association during March were as follows:

	West bound.	East-bound.	Totals.
C. & A.	\$10,059	\$1,269	\$11,329
C. B. & Q.	13,364	6,467	19,833
C. M. & St. P.	8,713	4,465	13,178
C. & N. W.	13,824	3,623	17,447
C. R. I. & P.	12,632	1,469	14,101
M. P.	658	28	686
W. St. L. & P.	8,614	4,100	12,710
Totals	\$67,862	\$21,421	\$89,283

The February business in the Association amounted to \$67,449, March thus showing a gain of \$21,834, or 32.5 per cent.

Colorado-Utah Association.

The earnings of the lines in the Colorado-Utah Association for February were as follows:

	West-bound.	East-bound.	Total.
C. & A.	\$6,277	\$5,496	\$11,874
C. B. & Q.	24,271	12,026	36,897
C. M. & St. P.	6,053	103	6,156
C. & N. W.	11,315	804	12,119
C. R. I. & P.	13,831	213	14,044
M. P.	612	9	622
W. St. L. & P.	8,134	619	8,754
Total	\$70,614	\$19,872	\$90,486

The total business in January was \$60,926, showing an increase in February of \$31,866, or 52.3 per cent.

Western Freight Association.

The earnings of the lines in the Western Freight Association for March were as follows:

	Revenue.	Tons.	Revenue.	Tons.	Total.
West. d.	\$6,012	\$6,409	2,980	\$12,442	
C. B. I. & P.	13,283	76,436	21,877	88,717	
W. St. L. & P.	9,981	31,392	10,192	41,378	
Totals	\$29,281	\$113,238	35,049	\$142,520	
C. B. & Q.	23,633	60,159	18,417	83,793	
C. & N. W.	18,043	13,771	5,915	31,815	
Grand totals	\$70,958	\$187,170	9,381	\$258,128	

This statement includes all the pools in the Association.

Coal.

Coal tonnages for the week ending April 10 are reported as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Anthracite	520,474	618,416	D. 95,943	15.6
Eastern bituminous	105,853	210,848	D. 105,333	50.0
Coke	61,942	50,097	I. 11,845	23.7

The strike of the miners in the Cumberland, Clearfield and adjoining bituminous districts continues without much change, although the Cumberland miners and operators have shown some disposition to discuss and arbitrate their differences. Bituminous coal is growing very scarce at tidewater,

and it is quite probable that many large consumers, who have been using bituminous coal for steam purposes, may be obliged to fall back on the anthracite, which is offered them at low prices.

Cumberland coal shipments for the week ending April 17 were 1,797 tons. Total to April 17 this year, 373,107; last year, 658,088; decrease, 284,981 tons, or 43.2 per cent.

Pennsylvania Railroad coal tonnage for the week ending April 17 was:

	Coal.	Coke.	Total.	1885.
Line of road	124,211	73,141	197,352	207,985
From other lines	84,343	71	84,414	83,870
Total	208,554	73,212	281,766	291,255

Year to April 17. 3,325,978 866,826 4,132,805 3,792,592

Decrease for the week, 9,489 tons, or 3.8 per cent.; increase for the year, 340,253 tons, or 8.9 per cent.

Cotton.

Cotton movement for the week ending April 16 is reported as follows, in bales:

Interior markets:	1886.	1885.	Inc. or Dec.	P.c.
Receipts	22,816	10,476	I. 12,340	117.4
Shipments	46,750	21,559	I. 25,191	116.6
Stock, April 16.	295,810	117,823	I. 171,987	150.0

Seaports:	1886.	1885.	Inc. or Dec.	P.c.
Receipts	56,305	23,723	I. 32,582	137.5
Exports	81,177	35,057	I. 46,120	131.7
Stock, April 16.	756,970	610,966	I. 146,004	23.9

The total movement from plantations for the crop year to April 16 is estimated at 6,170,534 bales, against 5,498,608 last year, 5,484,475 in 1883-84, and 6,561,533 in 1882-83.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Three months to March 31:

	1886.	1885.	Inc. or Dec.	P.c.
Ala. & Gulf.	\$289,382	\$300,544	D. \$11,162	3.7
Ind. Bloom. & W.	578,895	563,151	I. 15,744	2.8
Ind. Dec. & Spr.	98,859	85,632	I. 13,227	15.4
Marq., H. & O.	77,669	61,061	I. 15,608	24.7
Nash., C. & St. L.	557,519	546,042	I. 10,877	2.0
Net earnings	219,532	224,442	I. 4,906	2.2
N. O. & Nor. east.	169,638	165,117	D. 25,779	13.2
Texas & St. L.	336,447	282,560	I. 97,174	41.0
Vicks. & Mer.	131,935	114,864	I. 17,074	14.8
Vick., Shre. & P.	118,831	89,474	I. 29,357	32.6
Wisconsin Cent.	312,286	333,228	D. 20,942	6.3

Two months to Feb. 28:

	1886.	1885.	Inc. or Dec.	P.c.
California South.	\$73,719	-----	-----	-----
Net earnings	23,722	-----	-----	-----
Des. M. & Ft. D.	50,351	\$52,935	D. \$2,584	4.8
Net earnings	8,941	11,184	D. 2,243	20.0
Hous. & Tex. C.	410,865	293,646	I. 117,219	39.2
Net earnings	7,015	*42,280	D. *35,265	83.4

Month of April:

	1886.	1885.	Inc. or Dec.	P.c.
Atlantic System	1,401,530	1,317,870	I. 93,660	7.1
Net earnings	411,979	502,702	D. 90,721	18.3
Pacific System	3,033,087	3,139,242	D. 76,155	2.4
Net earnings	1,487,634	1,493,603	D. 5,969	0.4

Month of May:

	1886.	1885.	Inc. or Dec.	P.c.
California South.	\$47,055	-----	-----	-----
Net earnings	1,614	-----	-----	-----
Des. M. & Ft. D.	30,957	\$27,724	I. \$3,233	11.7
Net earnings	9,582	6,734	I. 2,848	42.5
Hous. & Tex. C.	185,839	144,937	I. 40,902	28.2
Net earnings	5,191	*22,115	D. *16,924	70.8

Month of March:

tion is completed, the full list being as follows: Chicago Committee, Hugh Riddle; Peoria and Indianapolis, L. D. Richardson and George R. Blanchard; Cincinnati, L. D. Richardson and John C. Gault; Louisville, R. H. Campbell and George R. Blanchard.

Central Iowa Traffic Association.

The earnings of the Central Iowa Traffic Association for the month of March were as follows:

	West-bound.	East-bound.		
Tons.	Revenue.	Tons.	Revenue.	
C. R. I. & P.	2,824	\$18,520	215	\$1,500
C. & N. W.	652	5,413	63	478
C. B. & Q.	1,394	7,682	246	1,234
C. M. & St. P.	1,125	6,116	58	384
W. St. L. & P.	1,020	5,834	45	326
Totals.	7,015	\$43,646	627	\$3,533

The Rock Island and the Burlington had over their portions, the other roads falling below.

A Day's Travel on the New York Elevated Roads.

The heaviest day's work ever done on the New York elevated roads was on Monday, April 19, when all the surface lines were stopped by the strike. In the 24 hours ending at midnight on that day the number of passengers carried was:

Second avenue line.....	33,310
Third " "	248,596
Sixth " "	161,436
Ninth " "	42,587
Total....	535,932

The heaviest days previously recorded are the Brooklyn Bridge opening, 389,501; Gen. Grant's funeral, 400,076 and the day of the street car strike last winter, 406,100. An average day's business at this season is about 320,000 passengers.

RAILROAD LAW.

Right to the Use of Water.

The Pennsylvania Supreme Court has just rendered its decision in the case of Miller against the Pennsylvania Railroad Co. The company is the owner in fee of certain lands on the line of its road where it crosses the Brandywine Creek. It maintains a pumping station at this point, drawing water from the creek for the water tank which supplies the engines with water. Mr. Miller, who owns a mill on the Brandywine below this point, brought an action of trespass on the case against the company in the Common Pleas of Chester County, claiming that his mill property was injured by the material reduction of the amount of water in the creek, due to its permanent diversion for railroad purposes, and recovered a judgment for his damages in said court. This judgment is now affirmed by the Supreme Court in an opinion by Mr. Justice Paxson, in which it is held that the right of the railroad company to the use of the water is a riparian right, incident to its ownership of the fee of the land, and, therefore, the common law action of trespass was the proper form of remedy and not a proceeding before viewers, as in the case of taking under the powers of eminent domain. As a riparian owner the company only had the right to divert the water for use on the land, returning it to its proper channel uncorrupted and without material diminution in quantity. Where such owner permanently diverts the waters of a stream so as seriously to affect a riparian owner below him, the right to damages at common law accrues.

Injury to Passenger—Negligence.

In the case of Hipsley against the Kansas City, St. Joseph & Council Bluffs Co., the Missouri Court of Appeals reverses the decision of the lower Court for defendant, and remands the case, holding as follows:

1. Where it is shown by the evidence that a passenger, without fault of his own, received injuries by the overturning or breaking down of the vehicle in which he is being carried, a *prima facie* case is made, and the onus is on the carrier to relieve himself of responsibility by showing that the injury was the result of an accident which the utmost skill, foresight, and diligence could not have prevented. This rule has been applied, by this Court, where horse-power and a hack were used by a carrier for transporting passengers, and it applies with equal if not greater force where steam is used as the motive power.

2. It is the province of the jury and not that of the Court to pass upon the credibility of witnesses and the weight to be given to their evidence; and where a plaintiff offered evidence to prove that he was a passenger on defendant's train, and that he was injured without any fault on his part, by the derailment of the train, this is a *prima facie* case entitling him to a verdict, and unless it was rebutted and overthrown by evidence of the defendant showing that the accident was not the result of a want of care and vigilance, the trial Court errs in giving an instruction in the nature of a demurrer to plaintiff's evidence.

3. Evidence as to the condition of the road-bed should be confined to the immediate vicinity of the accident, and to its condition at the time the accident occurred. Evidence that accidents had occurred on other portions of same road is likewise inadmissible.

OLD AND NEW ROADS.

Abilene & San Angelo.—Surveys are being made for this road, which is to extend from San Angelo, Tex., to a connection with the Texas & Pacific at Abilene, and grading is to be begun as soon as the location of the line is completed.

Baltimore & Ohio.—A strike of switchmen on this road in Chicago last week was settled by a compromise. The company refused to discharge several non-union men, whose employment caused the strike, but finally agreed to send them to other points on the road, and the strikers returned to work.

Boston & Maine.—It is stated that this company will assume control of the Worcester, Nashua & Rochester road under the lease agreed upon last winter on May 1.

California Southern.—This company's statement for January and February is as follows:

	January.	February.	Two months.
Earnings.	\$26,664	\$47,050	\$73,719
Expenses	48,772	48,660	97,441

Deficit..... \$22,108 \$1,614 \$23,722
 " Of the above expenses, \$18,788 in January and \$14,819 in February were extraordinary charges on accounts of wash-outs, etc. These deducted, the operating charges were \$29,989 in January and the deficit but \$3,325. The operating charges proper in February were \$33,849, leaving a surplus of \$18,205. The March, 1886, gross approximate earnings were a little under \$50,000."

Canada Atlantic.—On June 1 this company will put on a fast express train running over its own line from Ottawa to Rouse's Point. Heretofore the fast trains have run between Ottawa, Coteau and Montreal only. The new train will leave Ottawa at 8 p. m., making fast time to Rouse's Point and

connecting with the trains southward, and will return in the morning. The distance (133 miles), will be run in about three hours, which is pretty fast time, although not as fast as the trains on this road have made.

Central, of New Jersey.—Under the recent order of the Chancellor the directors are making arrangements to sell the bonds pledged by the Philadelphia & Reading Co. as security for the payment of the floating debt. The securities to be sold are \$1,000,000 Reading first series 5s and \$2,000,000 second series 5s. These securities will probably not bring a very large price if sold at forced sale.

Central Transportation Co.—At the annual meeting in Philadelphia, April 19, Senator Stevens offered a resolution, which was adopted, ratifying the resolution accepting the provisions of the new Pennsylvania constitution, and of the act of April 29, 1874, and its supplements. He also offered a resolution adopted at the recent special meeting, declaring a dividend of \$12 per share out of the funds held by the Philadelphia Trust, Safe Deposit & Insurance Co., and instructing the directors to secure the fund. It was adopted without debate.

W. E. Lockwood offered a series of resolutions explaining the terms of the lease with the Pullman Co., and authorizing the incoming board to carry them into effect. A motion to refer the resolutions to the incoming board was adopted. Another resolution by Mr. Lockwood was then adopted, directing that a committee of two stockholders and a legal representative, not connected with the management of the company, be appointed to prepare a plan to protect the company's interests, and authorized to carry the same into effect as soon as it has been signed by a controlling interest.

Chateaugay.—Work has been begun upon an extension of this road from the present terminus at Lyon Mountain, N. Y., westward to Loon Lake, 16 miles. The work is to be pushed as fast as possible. This extension will make the road 50 miles long, from Plattsburg, N. Y., to Loon Lake, and will carry it well into the Adirondack country. Mr. John Whalen, of Whitehall, N. Y., is the contractor.

Chicago, Burlington & Northern.—The following statement of track laid on this road up to April 10 is furnished from the General Manager's office. The distances below are given in miles and decimals of a mile:

	Main line.	Sidings.
From Savanna, Ill., north.....	18,448	0.227
" " south.....	11,376	
" " east.....	1,629	
From La Crosse, Wis., north.....	13,146	0.926
" " south.....	8,342	0.300
From Oregon, Ill., west.....	0.238	0.417
At Newport, Ill.		1.061
Winona Junction, Wis., to Trevino (Chippewa Valley Junction).....	33,000	
At East Dubuque, Ill.	0.086	
Total....	89,156	3,131

This makes a total of 92,287 miles of track laid, of which 89,156 miles are main line. Of this main track about 54 miles have been laid this year.

Chicago, Milwaukee & St. Paul.—This company has let contracts to D. C. Shepard & Co., of St. Paul, for grading 3 new lines in Dakota. The first an extension of the Hastings & Dakota Division, from Ipswich west 34 miles; the second an extension of the Sioux City & Dakota Division, from Scotland west 34 miles, and the third branch from the last-named line to Mitchell, also 34 miles. Grading is to be completed this season.

Work has been begun on the grading of a new branch from Defiance, Ia., on the Council Bluffs line, to Sioux City, a distance of 86 miles. It is said that work will be pushed on this line in order to prevent the building of the projected Sioux City & Des Moines road.

Chicago & Northwestern.—It is announced that this company has decided upon an issue of \$20,000,000 in new 4 per cent. bonds, having 40 years to run. These bonds are intended to provide for extension of the company's system, and an issue will be made when required, and may extend over several years. The first issue will be of \$5,000,000, and these bonds have already been negotiated by the company with a syndicate represented by Kuhn, Loeb & Co., Brown Brothers & Co., and J. Kennedy Todd & Co., of New York.

Cincinnati, Hamilton & Dayton.—The following preliminary statement is made for the fiscal year ending March 31 last:

Earnings (\$8,072 per mile)	\$2,855,947
Expenses (63.5 per cent.)	1,813,943
Net earnings (\$2,945 per mile)	\$1,042,004
Fixed charges	\$848,318
Dividends, 6 per cent.	210,000
	858,318

Balance, surplus for the year

As compared with the preceding year the gross earnings decreased \$9,987, or 0.3 per cent., and the expenses increased \$60,091, or 3.4 per cent., leaving a decrease of \$70,078, or 3.7 per cent., in net earnings.

It is reported that a controlling interest in the stock has been secured by Mr. C. P. Huntington. Part of the stock bought for him is in the stockholders' pool agreement, and it is said that he will not be able to vote a majority unless the pool agreement can be broken.

Cincinnati, Lebanon & Northern.—This company, which succeeds the old Cincinnati Northern, will issue \$1,000,000 in stock and \$200,000 in 5 per cent. bonds. The proceeds of the bonds will be used for improvements on the road, and \$76,000 have already been sold, principally to stockholders in the road.

East St. Louis Strike.—Traffic in the East St. Louis yards has been moved without serious interruption, although some delay and embarrassment have been caused by difficulty in obtaining men enough to do the work. The militia are still guarding the railroad property, and there have been a few scattered outbreaks of violence, but nothing like a riot or general disturbance. There appears to be much feeling, however, and many persons fear a new outbreak when the state troops are withdrawn.

Fort Worth & New Orleans.—Track on this road is now laid for 26 miles southeast from Fort Worth, Tex., and work is progressing steadily. It is expected that the construction train will reach Waxahachie early next month.

Gainesville & Dahlonega.—An effort is being made to secure capital for the purpose of completing this road. The line was graded several years ago from Gainesville, Ga., to the Chestee River, 12 miles, and 4 miles of track were laid. The company also built a bridge across the Chattahoochee River, which cost some \$15,000. The line traverses a section now without railroad facilities and which is thought to present many advantages for manufacturers, having many fine water powers.

Galveston, Sabine & St. Louis.—The directors of this company have resolved to begin work as soon as possible on the extension of the road from Longview, Tex., northward to a connection with the Texas & St. Louis, and from the

present southern terminus southward to a connection with the Houston, East & West Texas road.

Georgia Midland.—The entire length of this road from Columbus, Ga., to Griffin will be 65 miles. Mr. P. P. Dickson, of New York, the general contractor, last week let sub-contracts for the grading as follows: E. M. Hooten, of Pike County, Ga., 4 miles; R. M. & J. M. Brooks, of Pike County, Ga., 8 miles; F. M. & G. W. Clayton, of Clarksville, Ga., 8 miles; the Chattahoochee Bridge Co., of Atlanta, 26 miles; Foley & Lumley, of Ohio, the tunnel through Pine Mountain. These contractors are to begin work at once. There remain to be let 4 miles at the Columbus end and 15 miles near Griffin, the work on which is very light.

Gulf, Colorado & Santa Fe.—President George Sealy makes the following statement of the contract between this company and the Atchison, Topeka & Santa Fe and its intent: "The stockholders of the Gulf, Colorado & Santa Fe have now constructed and under construction in all 1,000 miles of track of road. These 1,000 miles of road, together with all landed interests in Texas, extensive wharf frontage and terminal facilities in Galveston, are to be put into the Atchison system as common property, upon the basis of \$8,000 stock per mile, or, say, \$8,000,000 of stock. The stockholders of the Gulf, Colorado & Santa Fe take in exchange for their property this stock in the Atchison, and become joint owners in the common property. An exchange of about \$4,400,000 of stock has been made, and the remaining \$3,600,000 will be delivered within the next 12 months, during which time the connection between the two roads will be made. The total bonded debt of the Gulf, Colorado & Santa Fe is limited not to exceed \$12,000 first mortgage and \$5,000 second mortgage bonds to each mile of main track. The consolidation of the two properties will give the Atchison a water connection from New York and the East via Galveston to the Pacific quite as short as the Southern Pacific via New Orleans. It will have the effect to make it the strongest system west of the Mississippi River, and it will represent less indebtedness per mile than any other large system in that section, or in fact anywhere in the United States. The earnings of the Gulf, Colorado & Santa Fe for the fiscal year beginning Jan. 1 to date have been about \$60,000 per month increase over corresponding months of last year."

Houston & Texas Central.—The Receivers' statement for February and the two months to Feb. 28 is as follows:

	February.	Two months.
Earnings.....	\$186,188	188,188
Expenses.....	181,839	\$144,937
Deficit.....	5,350	43,250
Charges.....	3,303	427
Total deficit.....	\$8,584	\$22,438
		\$14,338

Expenses include ordinary renewals and improvements. Charges include additions to property and interest on floating debt. For the two months the gross earnings increased \$117,219, or 39.2 per cent., and the expenses \$81,954, or 24.4 per cent., leaving a decrease of \$35,265, or 83.4 per cent., in the deficit.

Janesville & Evansville.—This company has been incorporated in Wisconsin to build a railroad from Janesville northwest to Evansville, about 15 miles. The company is controlled by the Chicago & Northwestern, and the line will be a cut off or cross connection between the company's Chicago & St. Paul line and the Wisconsin Division.

Kanawha & Ohio.—At a meeting held in Charleston, W. Va., April 17, the stockholders of this company voted to approve the consolidation with the Ohio & Kanawha Co. A meeting of the consolidated company was held in Columbus, O., April 21, for the purpose of completing the organization of the company, which succeeds to the possession of the line formerly known as the River Division of the Ohio Central.

Lake Shore & Michigan Southern.—The men employed in the Chicago yards struck on April 16, the company having refused their request for the discharge of a number of non-union men who were employed there. The strikers assembled in large numbers in the outer yards and prevented all freight trains from going out or coming in. No injury was done to property except by the removal of links and couplings, but no freight trains were allowed to pass, the passenger trains not being interfered with. The company has asked for police protection and will make an attempt to move trains with the force still at its command, but nothing has yet been done.

Mexican Railroad Notes.—The following note is from the Mexican Financier of April 10:

A new contract has been entered into by the Government and the Tlalmanalco Railway Co., of the state of Mexico. The contract provides that the company shall build its road at its own expense and operate it for 99 years from the station of La Compania, on the Morelos Railway, to the town of Amecameca. If the road is not completed within two years, it shall incur forfeiture. For the space of 15 years the railway company may import duty free all the material it may need for the road and telegraph line.

Minneapolis & Pacific.—This company was organized some few weeks ago to build a railroad from Minneapolis, Minn., to some point on the Red River, and a line was then surveyed running about half way between the two lines of the St. Paul, Minneapolis & Manitoba. It is now announced that arrangements have been completed to build the road, and the contract has been awarded to R. B. Langdon & Co., of Minneapolis. It is also stated that arrangements have been made to use the Northern Pacific tracks into Minneapolis, but the new project has no further connection with the Northern Pacific road.

Missouri Pacific.—It is now quite evident that the strike on this road is entirely at an end. Traffic proceeds without interruption and the officers claim to have a sufficient force to work the road properly. Money has been promised the strikers who have not gone back to work, but the contributions received so far have not been large enough to meet the necessities of the case.

It is reported that an order has been issued for the discharge of all section foremen who belong to the Knights of Labor and took part in the strike.

Nashville, Chattanooga & St. Louis.—This company's statement for March and the nine months of the fiscal year from July 1 to March 31:

	March.	Nine months.

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crease of \$64,747, or 34.8 per cent., in the surplus over all charges.

Northern Pacific.—At a meeting of the board last week it was decided not to wait for the completion of the tunnel on the Cascade Division, but to build a switch-back line over the mountain, for which surveys have been made, and to commence work upon this at once. Directions have been sent to the General Manager to invite proposals to complete the grading between Ellensburg and Green River, including the switch-back. The Cascade Division, when completed, will extend from Pasco Junction, Wash. Ter., to Tacoma, 248 miles. Of this 50 miles have been built east from Tacoma and 125 west from Pasco, leaving 73 miles unfinished, including the tunnel. Of this gap 44 miles are east and 27 west of the tunnel. The tunnel itself will be 2 miles long. Work has been begun upon it, but it is expected that it will take not less than two years to finish it.

Contract for building the Spokane Falls & Palouse branch has been let to Nelson Bennett, who is contractor on the Cascade Division. Work is to be begun at once.

The contract for building the shops recently destroyed by fire at Brainerd, Minn., has been let to A. Bjurquist, of Moorhead, who is to begin work at once.

Oregon Improvement Co.—This company's statement for February and the three months of the fiscal year from Dec. 1 to Feb. 28 is as follows:

February.		Three months.	
1886.	1885.	1885-86.	1884-85.
Gross earnings ...	\$186,384	\$210,850	\$590,500
Operating exps.	157,512	171,534	523,788

Net earnings \$28,792 \$30,316 \$66,712 \$124,513

For the three months the gross earnings decreased \$81,666, or 12.2 per cent., and the expenses \$23,865, or 4.3 per cent., leaving a decrease of \$57,801, or 46.3 per cent., in net earnings.

Pennsylvania.—This company last week issued in circular form important modifications of the relief plan. The greatest changes made are the removal of obligation to enter the relief fund and permitting of withdrawals from it. There is very little doubt that the plan as modified will be accepted, the principal objections to it having been removed, and it will go into effect on May 1. The company, as trustee, will pay any deficiencies which may arise from the fund not proving sufficient to meet the demands upon it. Here are the principal modifications:

1. Membership in the relief fund will be entirely voluntary.

2. Any member may withdraw on giving notice prior to the 25th day of any month.

3. Any member may on application change to a lower class.

4. No employé can become a member of the fund until he has been at least six months in the service, and no one whose service has been less than five years can advance to a class higher than that determined by his pay.

5. Death benefits are applicable to death from either accident or natural causes, and the additional death benefit which a member may take is limited to an amount equal to the death benefit of the class in which he contributes.

6. As membership is absolutely voluntary, the provision for continuing death benefit on leaving the service is necessarily omitted.

7. Full accident benefits will be paid for 52 weeks.

8. The sick benefit has been reduced to 40 cents per day. Sundays will be included in the payment of disablement benefits.

9. Employés in the service prior to Feb. 1, 1886, may become members without regard to age and without medical examination if able to attend to duty. To obtain this privilege they must make application for membership prior to Aug. 1, 1886.

10. Any employé not in the service prior to Feb. 1, 1886, must have been in the company's employ at least six months before he can become a member.

11. After five years' service, an employé not over 45 years of age may enter a higher class on passing a medical examination. If such service is not at all previous to Feb. 1, 1886, it must include one year's membership in the Relief Fund.

12. New applications will not be required from employés who shall have become members of the Relief Fund prior to May 1, 1886, but their classes and benefits will be made to conform to the modified regulations.

Peoria, Decatur & Evansville.—Mr. George L. Bradbury, late General Manager of this road, has issued the following circular, dated Peoria, Ill., April 20:

"The owners of the Evansville & Terre Haute Railroad Co. have acquired the control of this property by securing a majority of this board of directors and the election of Mr. D. J. Mackay as President of the company, vice Mr. C. R. Cummings, resigned. Commencing with May 1, 1886, the management of the company will be merged with that of the Evansville & Terre Haute Railroad Co., with general offices at Evansville, Ind."

"In retiring from the management of the company, as I will on the above-mentioned date, after a service of nearly nine years, I desire to express my great acknowledgement and heartfelt thanks to the officers and employés for their earnest co-operation and cordial support, and for the fidelity with which they have discharged their several duties in the interests of the company. I bespeak for the new management the same hearty support and earnest efforts heretofore accorded to myself."

Philadelphia & Reading.—The Special Master has filed a supplement in the United States Circuit Court to the report recently filed with reference to the petition of the Receivers for authority to construct certain equipment at a cost of \$750,000. The supplemental report contains a form of car trust certificates, submitted by counsel for the Receivers, and of which the master approves. The form provides that the certificates shall be for \$1,000 each, and that there shall be interest at the rate of 5 per cent., payable semi-annually.

In case of default in the payment of interest, the Receivers are authorized to sell the equipment purchased and constructed with the money raised on the certificates, upon request of one-tenth in amount of the shareholders, and then appropriate the proceeds to the payment of interest, the balance thereafter to be divided *pro rata* among the certificate holders. The Court took no action on the report.

Ravenswood, Spencer & Glenville.—This company has been organized to build a railroad from Ravenswood, W. Va., through Spencer to Greenville. The town of Ravenswood has subscribed \$35,000, and other subscriptions are offered along the line. The road, which will be about 50 miles long, will connect at Ravenswood with the extension of the Ohio River road from Parkersburg southward, and also with the steamboat line on the Ohio.

Richmond & Danville.—This company on April 16 took formal possession of the Virginia Midland road under the lease for 99 years lately agreed upon, and will hereafter operate that road directly. The terms of the lease, as stated elsewhere, are that the lessor company is to receive the net earnings of the road, the lessee guaranteeing 5 per cent of \$12,500,000 bonds.

Rochester & Pittsburgh.—The New York Supreme Court at General Term has reversed the judgment of the Special Term, refusing to modify the decree of foreclosure and sale. The General Term directs that the Rochester & Pittsburgh Railroad Co. convey all its property in New York and Pennsylvania to Adrian Iselin, of New York, the purchaser at the foreclosure sale, holding that it is incumbent upon the Court thus to make the judgment and sale effectual to pass title to the purchaser. This decision brings the Court into direct conflict with the Pennsylvania Court, which has enjoined the company from executing any such deed for the property in Pennsylvania.

Rome, Watertown & Ogdensburg.—The following circular from General Manager H. M. Britton is the official announcement of the lease noted last week; it is dated Oswego, N. Y., April 14.

"The Utica & Black River Railroad, together with its leased line, having been this day leased by, and all of its property delivered to the Rome, Watertown & Ogdensburg Railroad Co., all of its employés will hereafter be in the employ of the Rome, Watertown & Ogdensburg Railroad Co.

"Having been appointed General Manager of the Rome, Watertown & Ogdensburg Railroad Co., including the property this day leased, the position is hereby assumed."

"All officers, agents, and employés of the Utica & Black River Railroad Co. will continue in the service of the Rome, Watertown & Ogdensburg Railroad Co., in the positions occupied by them, until further advised.

"All rules and regulations now in force upon the Utica & Black River Railroad will remain in force, and employés will observe all rules and regulations, and will, until further orders, report to the heads of departments of the Utica & Black River Railroad, as heretofore, and heads of departments will report to the General Superintendent."

The Rome, Watertown & Ogdensburg Co. now operates 585 miles of road in all.

St. Louis, Arkansas & Texas.—This company has filed articles of incorporation in Missouri. The capital stock is fixed at \$12,500,000, and the line covered by the articles is from Birds' Point, Mo., to Texarkana, Tex. The organization is made by the bondholders who bought the Texas & St. Louis road at foreclosure sale.

St. Louis, Kansas City & Colorado.—Track is reported laid on this road from Forsythe Junction, on the Wabash, St. Louis & Pacific, near St. Louis, north by West 14 miles, leaving only 3 miles to be laid to reach Creve Coeur Lake. The company expects to run trains to the lake by the end of the month.

San Antonio & Aransas Pass.—Surveys are now being made for the proposed branch of this road from Beeville, Tex., to Corpus Christi, and contracts will be let as soon as the road is located.

Track on this road is now laid to a point 10 miles south-east from the late terminus at Beauregard, Tex., and 52 miles from San Antonio. The work is progressing steadily.

Savannah, Dublin & Western.—Sealed proposals for grading this road from Lott's Creek to Dublin, Ga., about 70 miles, will be received at the office of the President, No. 306 Stock Exchange Place, Philadelphia, and at the office of Chief Engineer Arthur Pou, No. 66 Bay street, Savannah, Ga., until May 14 next. Bids should be made out in duplicate, and sent to both offices. Profiles and specifications can be seen at either. Bids may be made on the whole work, or on any section not less than 20 miles. The bids will be opened at noon on May 15, and the contracts awarded within 5 days thereafter. Contractors must begin work not later than June 1 next.

Sedalia, St. Louis & Chicago.—This name has been adopted by the company which was recently organized to build a railroad from Sedalia, Mo., northward to Marshall, to connect with the Chicago & Alton road. The projectors will try to raise the necessary funds by local subscriptions.

Southern Pacific Co.—This company's statement for February is as follows:

	February.	Two months.	
	Atc. Syst. m. Pac. System.	Total.	Total.
Earnings	\$666,552	\$1,789,645	\$2,456,107
Expenses	473,076	790,674	1,263,750
		2,565,004	
Net earnings	\$193,476	\$98,971	\$1,192,447
Rental of leased lines		46,680	93,361
Total net income		\$1,239,127	\$1,099,974
Fixed charges		1,186,107	2,372,214
Construction and improvement		18,440	30,242
Total charges		\$1,204,547	\$2,402,456
Surplus or deficit		\$8,54,580	D. \$409,482

Fixed charges include interest, rentals, taxes and government charges. For the two months the total gross earnings increased \$7,505, or 0.2 per cent., and the expenses \$104,197, or 4.2 per cent., leaving a decrease of \$96,692, or 4.8 per cent., in net earnings.

A new corporation, known as the Southern Pacific Branch Co., has been organized to build a line from Newhall, Cal., on the Los Angeles Division of the Southern Pacific, to Santa Barbara, and thence to San Luis Obispo and San Miguel. This line will run near the coast and will be about 250 miles long.

Work will soon be begun on the gap between Soledad, Cal., on the Northern Division of the Southern Pacific, and Bakersfield, on the Southern Division. This line will require some heavy work, and will give the company two lines from San Francisco into the San Joaquin Valley.

Texas & Pacific.—The general reorganization committee has held several meetings, but has reached no conclusions as yet.

At a meeting of the bondholders of the Rio Grande Division in New York, April 19, Col. C. M. McGhee, William C. Hill and Isaac L. Rice were appointed a committee to protect the interests of those holders in the reorganization of the line now taking place.

Texas & St. Louis.—The St. Louis *Republican* has published the following regarding this road: "The owners of the land grant bonds of the Texas & St. Louis Railway Co. have finally agreed upon a general plan of action which it is expected will let them out of the venture without loss and possibly make the investment a profitable one, notwithstanding the uncertainty that has been attached to the transaction almost ever since the bonds were issued. As is known, there were two factions among the bondholders, and owing to reported failures to pool their issues, as it were, the whole investment was threatened, but now that a basis of operation has been agreed upon, there is no doubt but good results will follow. The plan is to organize a land company with a nominal share capital of \$25,000, which will be subscribed to by the bondholders in proportion to their bondholdings. The mortgage will then be foreclosed and the land bought in by the land company, who will undertake to peddle it out in sections and parcels to speculators and home-seekers. The whole of the grant lies in Texas and embraces 1,128,000 acres of located land and State warrants calling for 1,300,000 more, making in all

2,428,000 acres. The grant is mortgaged for about \$2,200,000, which would be considered a very light lien but for the fact that the land lies in Western Texas, somewhat beyond the agricultural belt; still it ought to average about \$1 per acre. The general committee to bring matters to a head is composed of Messrs. Fordyce, Clark, Paramore, Bemis, Kerns, Gilkerson, Wolff, Woerishoffer and Phillips, with Wolff and Phillips a special sub-committee to work up the details."

Toledo, Columbus & Southern.—The American Loan & Trust Co., of New York, has filed a complaint in the United States Circuit Court in Toledo, O., asking for the appointment of a receiver for this road, and also for a sale of the road under the mortgage. The complaint represents that plaintiff is trustee under the first mortgage of the road and that it holds the bonds for certain persons who have advanced large sums of money to the company for the purpose of paying off debts and extending the road from its present terminus at Findlay to Columbus. It also charges that while these persons were carrying out their contracts Mr. T. T. Brown, now President of the company, entered into a contract with the Columbus, Hocking Valley & Toledo and the Central Ohio companies, under which he undertook to prevent the building of the extension and to transfer the road to this company. It is charged that the recent election, at which Mr. Brown was chosen President and his friends directors, was not legal, and asks that it be set aside. The trustee also represents that the interest upon the bonds is unpaid and that the company's property is deteriorating under the present management. The case was to come up this week.

Union Pacific.—This company gives notice that it will buy and hold uncanceled the coupons due May 1 on the \$1,500,000 first-mortgage bonds of the Denver, South Park & Pacific Co. The Union Pacific Co. operates that road and holds all the stock. The earnings, it is stated, have not been sufficient to meet the May interest.

Utica & Black River.—The following circular from President John Thorn announces officially the lease noted last week; it is dated Utica, N. Y., April 14:

"The Utica & Black River Railroad, with its leased line, having been leased to the Rome, Watertown & Ogdensburg Railroad Co., the property is hereby delivered to the Rome, Watertown & Ogdensburg Railroad Co., lessee.

"All officers and employés of the Utica & Black River Railroad Co. will hereafter be under the direction of the Rome, Watertown & Ogdensburg Railroad Company."

Virginia Midland.—The property of this company was transferred formally to the Richmond & Danville Co. on April 16, under the lease for 99 years just concluded. Under the terms of the lease the debt of the Virginia Midland is to be as soon as possible funded under one general mortgage for \$12,500,000, the bonds to bear 5 per cent. interest. The lessee will guarantee the interest on these bonds, and will pay over any surplus which may remain after meeting the interest to the Midland Co., to be applied upon the stock.

West Shore.—Referee Cassidy, who made the foreclosure sale, makes a preliminary report, stating that he has paid \$4,250,000 in receivers' certificates and interest, with receivers' notes of more than \$600,000. He has paid vouchers and accounts to the amount of \$700,000. The additional indebtedness yet to pay will be between \$300,000 and \$400,000, and from the \$1,000,000 now on deposit with the Union Trust Co. there will be about \$600,000 to go back to the purchasers. The total amount of West Shore bonds placed in the Referee's hands for indorsement and percentage was \$49,888,000. These have been indorsed and delivered to Drexel, Morgan & Co. The \$112,000 balance of the \$50,000,000 only receives 24 per cent. of their face. The holders of the latter receive no advantage from the reorganization arrangement. The certificates of indebtedness are all paid with the exception of \$6,200, which the Referee has been unable to find, and he does not know who holds them. The final report to the Court will soon be ready.

ANNUAL REPORTS.

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all carried to the North, and with northerly connections at Ruthven this business would become at once larger and more remunerative, as the supply at the south end of the road is abundant and the demand in Minnesota is unlimited. The management has frequently called the attention of the stockholders to the importance of extending the line to a connection with the large roads in Minnesota, which need the coal supplied on our line. No more suitable time than the present exists for such an extension, and it is hoped that this may be accomplished by us at an early period.

"The business on the extension of 56 miles from Tara to Ruthven is growing, its earnings for 1884 having been \$58,097, while for 1885 they were \$75,631, besides delivering to the main line all its freight, which is carried by the main line to Des Moines.

"The earnings of the road having been insufficient to fully meet the 8 per cent. interest on the \$1,872,000 of first-mortgage bonds falling due on Jan. 1, 1885, and, therefore, the four coupons for the years 1885 and 1886 were called in, and eight coupons substituted, by which one-half the interest, or 3 per cent., was to be paid at the regular dates, and the other half of the interest was deferred for three years. It is provided that the payment of the deferred interest will commence Jan. 1, 1888."

St. Louis, Vandalia & Terre Haute.

This company owns a line from East St. Louis, Ill., to the Indiana state line near Terre Haute, 158.3 miles. There are 44.6 miles of sidings. The entire main track is now laid with steel rails and ballasted with gravel or stone.

The road is leased to the Terre Haute & Indianapolis Co., but the lessor company makes its report separately, covering the year ending Oct. 31.

The equipment includes 43 locomotives; 14 passenger, 1 postal, 2 express and 7 baggage cars; 821 box, 306 stock, 100 flat, 254 coal and 23 caboose cars; 4 wrecking and tool, 100 flat and 89 gravel cars.

The general account is as follows, condensed:

Common stock	\$2,383,016
Preferred stock	1,544,700
Funded debt	4,499,000
Accounts and balances	110,733
Income account, surplus	274,823
Total	\$8,812,272
Road and equipment	\$8,343,739
Accounts and balances	465,394
Cash	3,139

The funded debt includes \$1,899,000 first-mortgage bonds and \$2,600,000 second-mortgage bonds. There was no change during the year.

The earnings for the year were as follows:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Freight	\$787,719	\$787,450	D. \$90,740	10.3
Passenger	419,413	454,518	D. 35,413	7.8
Mail and express	169,413	151,183	I. 9,230	6.1
Rents, etc.	5,410	6,147	D. 737	12.1
Total	\$1,372,647	\$1,490,307	D. 117,660	7.9
Expenses	921,684	1,114,764	D. 189,080	17.3
Net earnings	\$450,963	\$375,543	I. \$75,420	20.1
Gross earn. per mil.	8.871	9.414	D. 743	7.0
Net	2,849	2,372	I. 477	20.1
Per cent. of exps.	67.1	74.8	D. 7.7	...

Expenses include cost of 26 tons of steel rails and 75,427 new ties used in renewals, 1.58 miles of track ballasted and 5,308 ft. new sidings laid.

The result of the year was as follows:

Net (30 per cent. of gross earnings)	\$411,794
Interest	314,930
Taxes and general expenses	50,457

Balance, surplus for the year	\$46,407
Balance from previous year	228,416

Total, surplus, Oct. 31, 1885 \$274,823

The actual net earnings for the year were \$450,963; the rental paid was \$411,794, leaving a profit to the lessee of \$39,169, as against a loss of \$71,549 for the previous year.

The traffic for the year was as follows:

	1884-85.	1884.	Inc. or Dec.	P. c.
Pass. train-miles	449,854	420,853	I. 20,001	6.9
Freight	865,984	973,854	D. 107,890	11.1
Other	26,610	69,293	D. 42,683	61.6

Total	1,342,428	1,464,000	D. 121,572	8.3
Passenger carried	308,615	323,201	D. 14,586	4.5
Passenger-miles	19,165,187	18,741,460	I. 423,727	2.3
Ton freight carried	1,260,910	1,144,510	I. 56,400	4.9
Ton-miles	107,920,692	104,209,730	I. 3,710,972	3.6

Av. train load:	
Passengers, No.	42.6
Freight, tons	124.6

The earnings per train-mile last year were 104.3 cents; expenses, 70; net earnings, 34.3 cents, against 26.8 in 1884, an increase of 7.5 cents, or 28 per cent.

The average receipt and cost per unit of traffic were, in cents:

	1885.	1884.	
R. c. p. Cost.	1,634	1,553	2,425
Per passenger-mile	2.187	1.634	0.553

The average rate per ton-mile was: Local, 2.120; foreign, 0.523; average, 0.730 cent.

The conditions of the year were an increase of freight traffic carried at exceedingly low rates. The gain was not only in through business, but also in iron ore carried east from St. Louis, which is comparatively a new traffic, and is necessarily carried at low rates. There was gain in through but a decrease in local passenger business.

Atchison, Topeka & Santa Fe.

The lines operated and controlled by this company at the close of the last fiscal year, Dec. 31, 1885, were:

1. The parent road and its auxiliaries, called the Atchison System, with a mileage in Missouri, Kansas, Colorado, New Mexico and Texas of 1,868.14 miles.

2. The Southern Kansas System, all situated in Kansas, of 528.80 miles.

3. The Sonora System, lying in the territory of Arizona, and in the state of Sonora, Republic of Mexico, 350.19 miles.

4. Lines owned jointly with other companies in Kansas, half mileage, 73.92 miles.

The Atchison and the Southern Kansas systems are operated together, and figures given below are for those systems, 2,396.94 miles in all. The operations of the Sonora System, and of the lines owned jointly, are given under separate heads.

Additions during the year were 0.38 mile to the Atchison and 21.87 miles (Harker, Kan., to Kiowa) on the Southern Kansas, a total of 22.25 miles.

The equipment includes 378 locomotives; 119 passenger, 4 chair, 30 sleeping and drawing room, 16 combination, 35 emigrant sleeping and 68 baggage, mail and express cars; 4,692 box, 9 refrigerator, 31 fruit, 685 combination, 1,147

stock, 852 flat, 2,816 coal and 151 caboose cars; 3 officers cars, 2 pay cars and 26 service cars.

Expenditures last year for additions to property were: Improvements and new equipment, \$977,853; building new roads, \$474,877; coal lands and other property, \$419,753; total, \$1,872,488.

The general account, condensed, is as follows:

Capital stock (including \$150 scrip)	\$56,913,250
Bonds, Atchison Co.	5,076,300
" Southern Kansas (all held by Atch. Co.)	30,968,000
" auxiliary lines operated	11,819,000
Interest and dividends	1,788,117
Land grant trust	2,703,870
Suspended accounts, balance	583,847
Insurance fund	1,387,500
Renewal and improvement fund	500,000
Income accounts	7,387,525
Canceled bond accounts	2,350,000
Total liabilities	\$128,425,851
Road and property	\$52,005,584
Auxiliary lines operated	63,089,236
Sundry property accounts	197,431
At'c & Pacific R. R.	2,008,082
California Southern R. R.	1,569,856
Seculars owned	3,375,918
Materials and supplies	1,363,345
Accounts receivable	2,598,875
Cast	1,864,528
Total	128,425,851

The assets do not include \$1,676,273 land notes and 347,254 acres of unsold lands. The amount represented in the income and canceled bond accounts is chiefly invested in additions to property. The stock is \$20,174 and the bonds \$18,753 per mile of road.

There were redeemed last year \$481,500 bonds of various issues, and there were issued \$2,500,000 sinking fund bonds, making a net increase of \$2,018,500 in the funded debt. The only change in stock was the issue of \$100 for outstanding scrip.

The earnings for the year were as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Freight	\$10,873,021	\$11,646,454	D. \$1,072,833	9.3
Passengers	3,894,411	3,583,018	I. 306,393	8.6
Mail and express	672,568	647,000	I. 24,968	3.6
Miscellaneous	135,795	114,811	I. 20,984	18.2
Total	\$15,571,395	\$16,291,883	D. \$720,488	4.4
Expenses	8,314,968	8,975,976	D. 661,008	7.4
Ket earnings	\$7,256,427	\$7,315,907	D. \$59,480	0.8
Gross earn. p. mile	6,533	6,971	D. 438	6.3
Net	3,044	3,130	D. 86	2.8
Per cent. of exps.	55.4	55.1	D. 1.7	...

Expenses include taxes, which last year amounted to \$459,194, or 2.95 per cent. of gross earnings.

The result of the year was as follows:

Net earnings, as above	...	\$7,256,427
Interest and miscellaneous	...	177,755

Expenses include taxes, which last year amounted to \$459,194, or 2.95 per cent. of gross earnings.

The result of the year was as follows:

Total	...	\$7,434,183
Pool payments	...	\$46,093
Atchison Employes' Association	...	25,000
Interest, Atchison bonds	1,638,325	
" Southern Kansas bonds	312,340	
" bonds of auxiliary lines	854,930	
" Sonora bonds	283,500	
Rental of r. rolling stock	25,500	
Sinking funds	299,525	
Dividends, 6 per cent.	3,414,786	
		6,929,900

Balance, surplus for the year \$504,184

Interest on the land-grant bonds (\$180,188) was met from the proceeds of land sales turned over by the trustees for that purpose.

The traffic for the year was as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Pass. train-miles	2,052,608	2,536,132	I. 416,470	16.4
Freight	4,474,980	4,427,101	I. 47,879	1.1
Total loco. miles	9,974,417	9,045,017	I. 29,400	0.3

Passengers carried